UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Bureau of Commercial Fisheries

BRIEFING MATERIAL
FOR
PROGRAM REVIEW

BIOLOGICAL LABORATORY
HONOLULU, HAWAII

April 8-12, 1968

REVIEW COMMITTEE

Dr. Roland F. Smith, Assistant Director for Biological Research, BCF, Washington, D.C. (Chairman)

Dr. W. Bruce McAlister, Oceanographer, BCF Biological Laboratory, 2725 Montlake Boulevard E., Seattle, Washington 98102

Mr. Alonzo T. Pruter, Chief, Branch of Exploratory Fishing, Division of Industrial Research, BCF, Washington, D.C.

Mr. Paul Sund, Branch of Marine Fisheries, BCF, Washington, D.C.

Dr. N. J. Wilimovsky, National Council on Marine Sciences, Room 405, Executive Office Building, Washington, D.C. 20050

PROGRAM REVIEW

Biological Laboratory
Honolulu

April 8-12, 1968

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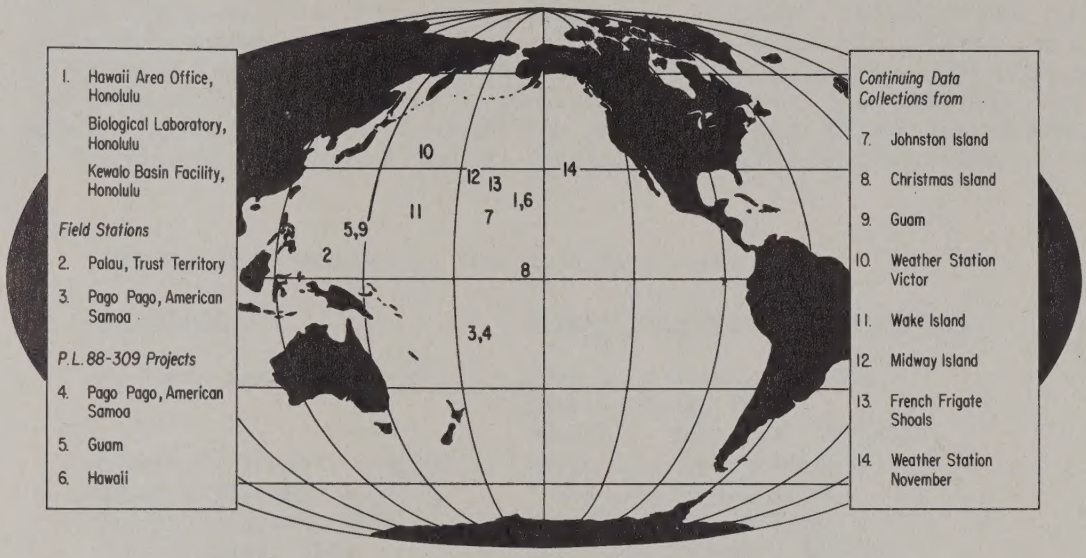
HISTORY



The Hawaii Area, BCF, has as its area of investigation the high seas of the tropical and subtropical Pacific Ocean.

Since late 1949, scientists at the Biological Laboratory, Honolulu have studied the oceanic fishery resources of an area of the Pacific Ocean approximating 13 million square miles--more than four times the size of the contiguous United States. This program of exploratory oceanographic and fishery surveys and accompanying biological studies of ocean fishery resources, particularly the tunas, had its inception in a proposal for fishery research prepared in 1944 by the Territorial (now State) Division of Fish and Game. The proposal, known as the Farrington Bill and passed by the 80th Congress as Public Law 329, resulted from general expressions of interest by the fishing industry both in the continental United States and in Hawaii. Funds were appropriated to the Department of the Interior and in August 1948 the Pacific Oceanic Fishery Investigations (POFI) was organized with headquarters to be located in Honolulu, Hawaii. In 1958, as a result of the Fish and Wildlife Act of 1956, the Hawaii Area of the Bureau of Commercial Fisheries was established.

Public Law 329 authorized and directed the Secretary of the Interior to conduct fishing explorations and necessary related oceanographic, biological, technological, statistical, and economic studies to insure maximum development and utilization of the high-seas fishery resources of the territories and island possessions of the United States in the tropical and subtropical Pacific Ocean and intervening seas.

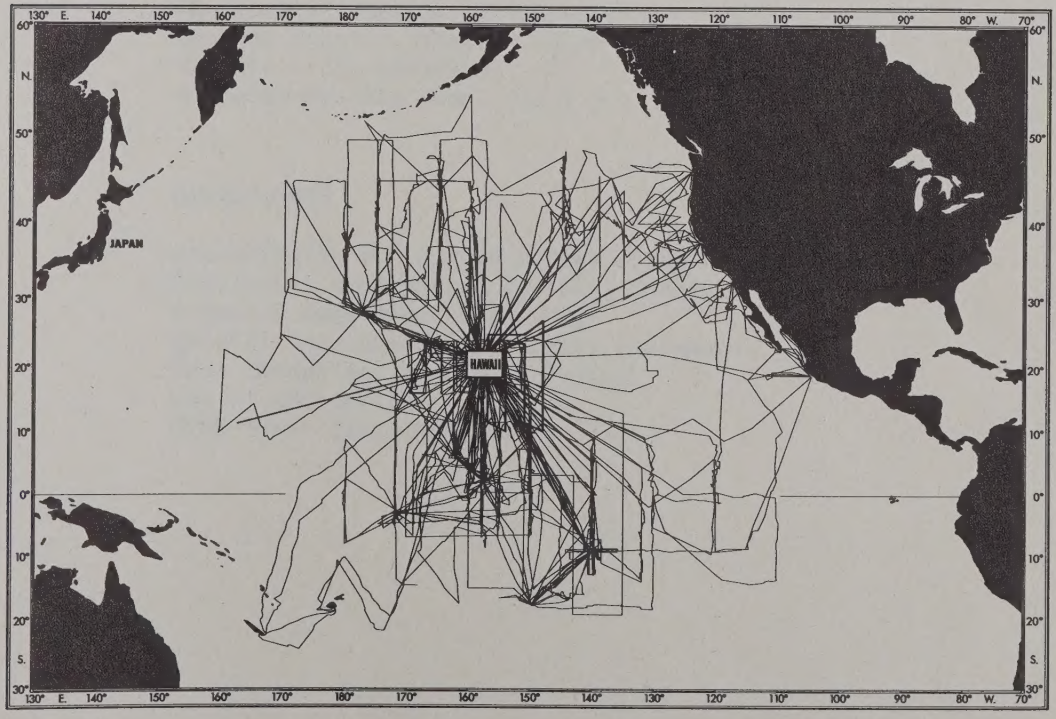
The first work of this new fishery research laboratory included studies of the oceanography of the central tropical and subtropical Pacific, of the distribution, abundance, and biology of the tunas, of

their commercial potentialities, of technology and economics of the tuna industry. In 1950, after some preliminary results of these investigations were available, the technological and economic studies were eliminated and effort concentrated on the oceanographic and biological studies and on the commercial potentialities of the central Pacific. These three broad areas of research formed the basis of the Laboratory's programs from 1951 through 1957. In 1957, a fourth area of investigation, that of tuna behavior, was added. In 1967, in order to undertake research of more direct application to the fishing industry, a fishery development program was initiated.

The Directors and Deputy Directors have been:

Directors	Deputy (or Assistant) Directors
O. Elton Sette, 1949-55	Fred F. Johnson, 1949-50
	John L. Kask, 1951
	Donald L. McKernan, 1951-55
Albert L. Tester, 1955-57	Garth I. Murphy, 1955-57
Garth I. Murphy, 1957-58	Vernon E. Brock, 1958
Vernon E. Brock, 1958-61	John C. Marr, 1959-61
John C. Marr, 1961-	Lucian M. Sprague, 1962-67
	Richard S. Shomura, 1968-

Frank J. Hester (6/21/70 - 8/31/73)
Richard S. Shomura (9/16/73 -



Cruises of the BCF, Hawaii Area, 1950-66.

The Hawaii Area lists among its major accomplishments the following items:

RESOURCE DISCOVERY

Equatorial yellowfin (Sette)
Central North Pacific albacore (Murphy et al.)
Marquesan skipjack (Austin, Wilson)
South Pacific albacore (Shomura)
Central Pacific skipjack (Rothschild et al.)
Hawaiian shrimp resource (Shomura)

RESOURCE ECOLOGY

North Pacific albacore migrations (Otsu)
Skipjack predictions (Seckel)
Tuna early life history (Matsumoto)
Tuna behavior and sensory capabilities (Magnuson et al.)
Tuna subpopulations (Sprague, Fujino)
Skipjack population model (Rothschild)

OCEANOGRAPHY

Equatorial undercurrent (Cromwell)
Central Pacific climatic atlas (Seckel)
Pacific atlas (Barkley)
Kuroshio-Oyashio model (Barkley)

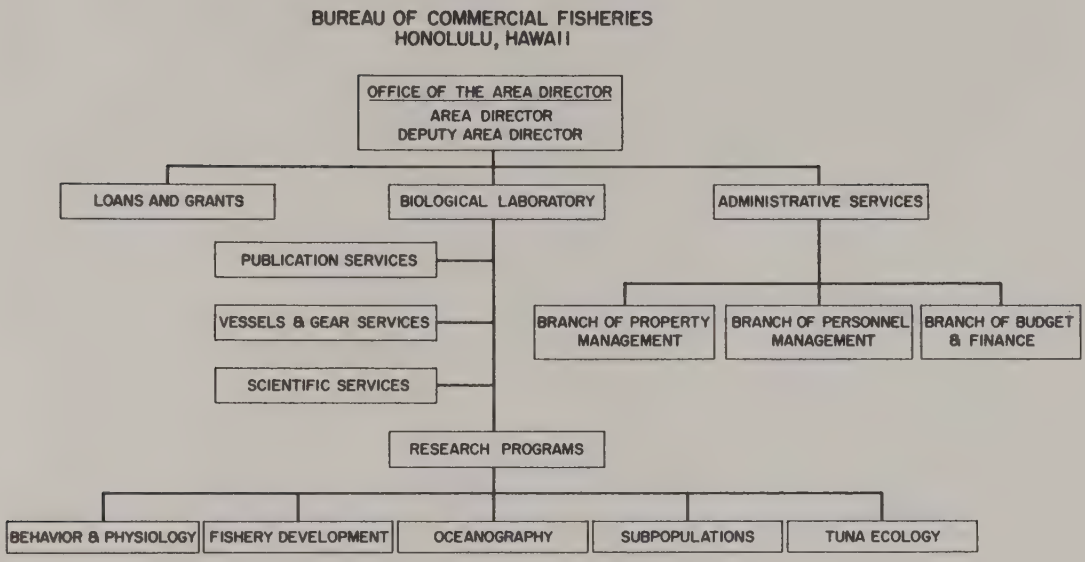
METHODOLOGY

Oceanography-biology-fisheries approach (Sette)
Underwater observation (Murphy, Gooding)
Research submarine (Strasburg)
Maintaining tunas in captivity (Nakamura)
Tuna immunology (Sprague, Fujino)
Use of ADP (Staff)
CTFM sonar (Magnuson, Yuen)

STATEMENT OF MISSION

The mission of the Biological Laboratory, Honolulu is to encourage the full utilization of the fishery resources of the tropical and subtropical Pacific Ocean. This mission includes, and is accomplished by, identifying those problem areas in the fishing industry that either involve a lack of information of the biology of the resources, the economics of the fisheries, or a lack of technological sophistication; selecting the problem areas that have feasible solutions which are capable of yielding a high industrial payoff at a sustaining level; and supplying the appropriate information and technological developments to the fishing industry.

ORGANIZATIONAL DIAGRAM



MANAGEMENT

JOHN C. MARR
Area Director

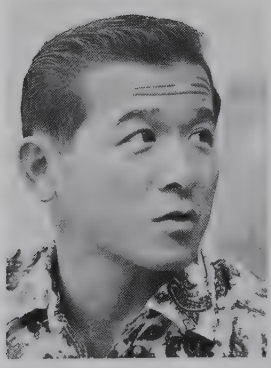
Born 1918. M.A., Stanford University, 1944. Joined BCF Hawaii, 1959. Affiliations, Fellow of American Association for the Advancement of Science, Fellow of American Institute of Fishery Research Biologists, American Society of Ichthyologists and Herpetologists, American Society of Limnology and Oceanography, American Fisheries Society, Sigma Xi, Hawaiian Academy of Science (President, 1967), Affiliate Graduate Faculty University of Hawaii.

FIELD: Population biology of marine fishes.

ACTIVITIES: Governor's Committee on Science and Technology (Chairman, Panel on Marine Resources); FAO Expert Panel for the Facilitation of Tuna Research; BCF representative, Pacific Science Congress, 1953, 1957, 1961, 1966; U.S. Delegate, Indo-Pacific Fisheries Council, 1962, 1964, 1966; U.S. Delegate, Meeting of Marine Science Experts on Kuroshio Region, 1963; U.S. Coordinator, Cooperative Study of Kuroshio and Adjacent Regions, 1964-; Assistant International Coordinator (Fisheries), Cooperative Study of Kuroshio and Adjacent Regions, 1965-; advisor, U.S. Delegation First U.N. Conference on the Law of the Sea, 1958; advisor, USAID Mission Korea, 1964.

HONORS: Guggenheim Fellow, 1964; BCF Incentive Award, 1964 for publication "The causes of major variations in the catch of the Pacific sardine Sardinops caerulea (Girard)"; Special Performance Award, 1966.

PUBLICATIONS, 1959-68: Published, 14; in press, 1.



RICHARD S. SHOMURA
Deputy Area Director

Born 1928. M.S., University of Hawaii, 1961. Joined BCF Hawaii staff, 1950. Affiliations, American Fisheries Society, American Institute of Biological Science, American Institute of Fishery Research Biologists, Ecological Society of America, Hawaiian Academy of Science, American Society of Ichthyologists and Herpetologists, American Museum of Natural History.

FIELD: Ecology of marine fishes.

HONORS: Special Act Award, 1955; Quality Increase, 1966; nominated as Federal Executive, 1966; Superior Performance Award, 1967.

PUBLICATIONS, 1950-68: Published, 18; in press, 3.

SENIOR STAFF

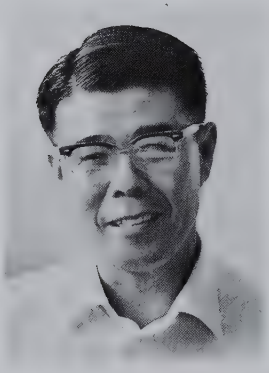
RICHARD A. BARKLEY
Oceanographer

Born 1929. Ph. D. (oceanography), University of Washington, 1960. Joined BCF Hawaii staff, 1960. Affiliations, Affiliate Graduate Faculty University of Hawaii, American Chemical Society, Sigma Xi, American Geophysical Union.

FIELD: Theoretical and actual distributions of temperature, salinity, and other properties of the ocean.

HONORS: Superior Performance Award, 1964; Board of Editors, Journal of Marine Research, 1967-.

PUBLICATIONS, 1960-68: Published, 5; in press, 3.



KAZUO FUJINO
Geneticist

Born 1925. Ph. D., University of Tokyo, 1962. Joined BCF Hawaii staff, 1964. Affiliations, Genetics Society of America, American Institute of Biological Sciences, Hawaiian Academy of Science, Japanese Society of Fisheries, Affiliate Graduate Faculty University of Hawaii.

FIELD: Blood groups of marine creatures and their significance to population genetics concepts.

PUBLICATIONS, 1964-68: Published, 5; in press, 2.

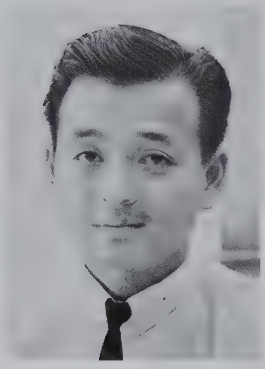
MARY LYNNE GODFREY
Technical Administrator

Born 1922. B.A., University of California, Los Angeles, 1943. Joined BCF Hawaii staff, 1950. Affiliation, Hawaiian Academy of Science.

FIELD: Oceanographic and biological data; data processing administration.

HONORS: Superior Performance Award, 1961; nominated as Outstanding Woman Federal Employee, 1967.

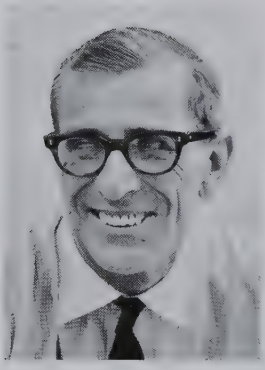
PUBLICATIONS, 1950-68: Published, 1.



EDWIN K. W. LEE
Public Administration

Born 1926. B.S., University of California, Berkeley, 1949. Joined BCF Hawaii staff, 1966. Affiliations, American Society of Public Administration, Honolulu Federal Employees Federal Credit Union, Waialae-Iki Community Association, Honolulu Federal Executive Board.

HONORS: Superior Performance Award, 1967; President, Honolulu Chapter, American Society for Public Administration, 1967-68.



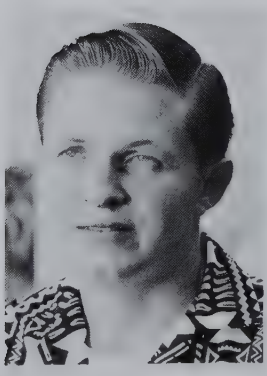
THOMAS A. MANAR
Technical Writer-Editor

Born 1912. B.A., University of Oklahoma, 1933. Joined BCF Hawaii staff, 1965. Affiliations, Society of Technical Writers and Publishers, Hawaiian Academy of Science, Western Society of Naturalists, Friends of East-West Center, Honolulu Academy of Arts, Bishop Museum Association.

FIELD: Technical publications.

HONORS: Special Act Award, 1966; Quality Increase, 1967.

PUBLICATIONS, 1965-68: Published, 6; in press, 3.

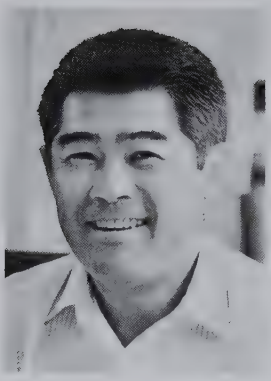


GARY H. MILLER
Ship's Captain

Born 1938. Kearny High School, Kearny, New Jersey, 1956. Joined BCF Hawaii staff, 1960.

FIELD: Seamanship.

HONORS: Superior Performance Award, 1962; Superior Performance Award, 1964; Superior Performance Award, 1965; Special Act Award, 1965.



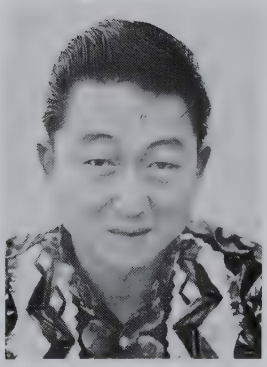
EUGENE L. NAKAMURA
Fishery Biologist

Born 1926. M.S., University of Illinois, 1951. Joined BCF Hawaii staff, 1956. Affiliations, American Association for the Advancement of Science, American Institute of Biological Sciences, American Fisheries Society, American Institute of Fishery Research Biologists, American Society of Ichthyologists and Herpetologists, American Society of Limnology and Oceanography, Hawaiian Academy of Science, Sigma Xi.

FIELD: Fish physiology and behavior.

HONORS: B.S. with High Honors in Zoology, University of Illinois; Superior Performance Award, 1965.

PUBLICATIONS, 1956-68: Published, 17; in press, 3.



TAMIO OTSU
Fishery Biologist

Born 1923. B.A., University of Hawaii, 1950. Joined BCF Hawaii staff, 1950. Affiliations, University of Hawaii Alumni Association, American Institute of Fishery Research Biologists, American Fisheries Society, Hawaiian Academy of Science.

FIELD: Ecology of marine fishes of the Pacific Ocean.

HONORS: Bronze Star; Superior Performance Award, 1962.

PUBLICATIONS, 1950-68: Published, 28; in press, 1.

BRIAN J. ROTHSCHILD
Fishery Biologist

Born 1934. Ph. D. (vertebrate zoology), Cornell University, 1962. Joined BCF Hawaii staff, 1962. Affiliations, editorial board, American Society of Ichthyologists and Herpetologists, American Fisheries Society, American Society of Limnology and Oceanography, American Society of Zoologists, Hawaiian Academy of Science, Sigma Xi, Affiliate Graduate Faculty University of Hawaii.

FIELD: Ecology and population dynamics of tunas.

HONORS: Visiting Fellow, Cornell University, 1965-66; Quality Increase, 1967.

PUBLICATIONS, 1962-68: Published, 23; in press, 4.

GUNTER R. SECKEL
Oceanographer

Born 1923. M.S., University of Washington, 1953. Joined BCF Hawaii staff, 1953. Affiliations, American Geophysical Union, American Society of Limnology and Oceanography, Hawaiian Academy of Science, Sigma Xi, Conservation Council for Hawaii, Affiliate Graduate Faculty University of Hawaii, Honolulu Symphony Society, Honolulu Academy of Arts.

FIELD: Oceanography of central Pacific Ocean.

HONORS: Superior Performance Award, 1962.

PUBLICATIONS, 1953-68: Published, 14; in press, 1.

WILLIAM T. TANAKA
Marine Superintendent

Born 1923. St. Louis High School, Honolulu, Hawaii, 1941. Joined BCF Hawaii staff, 1949. Affiliation, Hawaiian Academy of Science.

FIELD: Vessel operations and gear maintenance.

HONORS: Superior Performance Award, 1961; nominated as Outstanding Federal Employee, 1961; Special Performance Award (2), 1964; Quality Increase, 1965.

JOE YOSHIOKA
Ship's Captain

Born 1918. Manual Arts High School, Los Angeles, California, 1938. Joined BCF Hawaii staff, 1966.

FIELD: Seamanship.

PERSONNEL ROSTER

NAME	POSITION TITLE/GRADE
AREA DIRECTOR'S OFFICE	
John C. Marr	Fishery Administrator, GS-15 (Area Director)
Richard S. Shomura	Fishery Biologist (Res. Adm.), GS-14 (Deputy Area Director)
Carole A. Yukihiro	Secretary (Stenography), GS-8
Marjorie C. Siu	Secretary (Stenography), GS-6
Barbara L. Dwight	Clerk Typist, GS-3
ADMINISTRATIVE SERVICES	
Edwin K. W. Lee	Administrative Officer, GS-13 (Asst. Area Director for Administration)
Ethel K. Y. Chock	Clerk (Typing), GS-4
Barbara L. Comstock (temp.)	Clerk Typist, GS-3
Branch of Budget and Finance	
Joseph T. Arakawa	Budget and Accounting Officer, GS-11
Masakazu Uyesugi	Operating Accountant, GS-9
Janice F. Tokunaga	Fiscal Accounting Clerk, GS-5
Branch of Personnel Management	
Emmie H. Shigezawa	Personnel Officer, GS-11
Branch of Property Management	
Walter M. Bosworth, Jr.	Procurement Officer, GS-11
Richard L. Tom	Purchasing Agent, GS-7
Vivian M. Guerrero	Procurement Clerk (Stenography), GS-5
Tamotsu Nakamura	Property and Stock Control Clerk, GS-4
Melvin J. Dutro, Sr.	Clerk (Office Machine Operator), GS-3
SCIENTIFIC SERVICES	
Mary Lynne Godfrey	Supv. Physical Science Technician, GS-11
Bernard M. Ito	Physical Science Technician, GS-9
Henry M. Kishinami	Biological Technician (Fisheries), GS-7
Jerome S. W. Marr	Biological Technician (Fisheries), GS-7
Frank A. Moriguchi	Biological Technician (Fisheries), GS-7
Marian Y. Y. Yong	Mathematician, GS-7

NAME	POSITION TITLE/GRADE
Ollie Custer	Biological Technician (Fisheries), GS-6
Gary S. Kasaoka	Biological Technician (Fisheries), GS-6
Sally H. Kuba	Computer Technician, GS-6
Ella W. Mendiola	Physical Science Technician, GS-6
John J. Naughton	Biological Technician (Fisheries), GS-6
Joseph R. Sylvester	Biological Technician (Fisheries), GS-6
Robert M. Moncrief	Biological Technician (Fisheries), GS-5
Paul M. Shiota	Biological Technician (Fisheries), GS-5
Lucille T. Tsukano	Electric Accounting Machine Opr., GS-5
Warren K. Taguchi (temp.)	Biological Aid, GS-2

PUBLICATION SERVICES

Thomas A. Manar	Tech. Publications Writer-Editor, GS-13 (Fishery Biology and Oceanography)
Tamotsu Nakata	Illustrator (Scientific), GS-11
Hazel S. Nishimura	Librarian, GS-9
Robert Bonifacio	Illustrator, GS-7
Irene H. Toyomura	Office Services Supervisor, GS-6
Louise F. Lembeck	Clerk Typist, GS-4
Elizabeth F. Y. Young	Clerk Typist, GS-4

BIOLOGICAL LABORATORY

Behavior and Physiology Program

Eugene L. Nakamura	Supv. Fishery Biologist (Research), GS-13
Heeny S. H. Yuen	Fishery Biologist (Research), GS-12
Robert T. B. Iversen	Fishery Biologist (Research), GS-11
Randolph K. C. Chang	Biological Technician (Fisheries), GS-9
Reginald M. Gooding	Fishery Biologist (General), GS-9
James H. Uchiyama	Biological Technician (Fisheries), GS-7
Mariella George (temp.)	Biological Technician (Fisheries), GS-5

Fishery Development Program

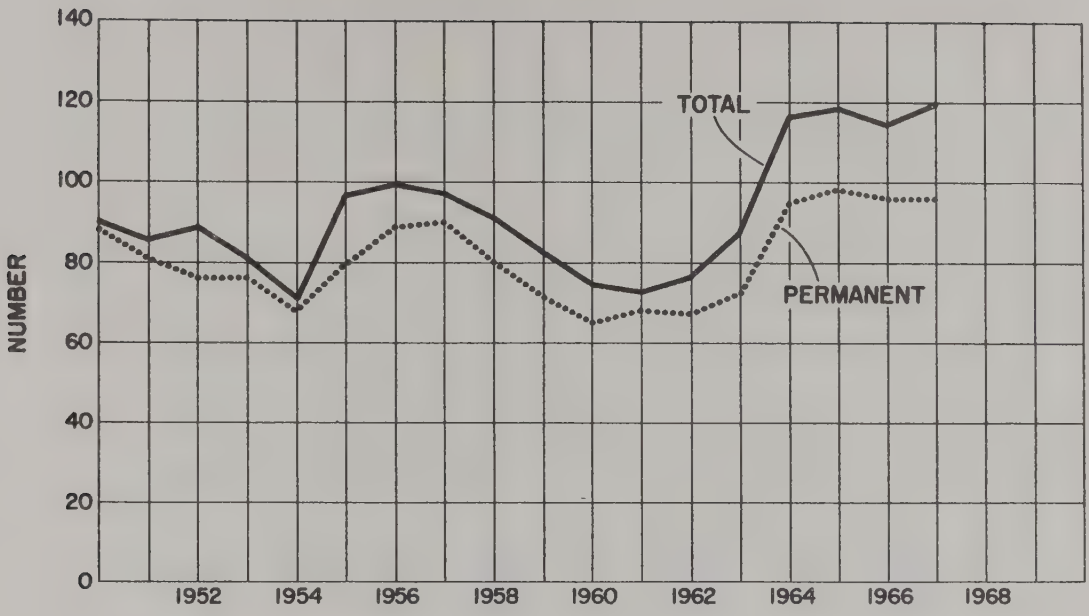
Thomas S. Hida	Fishery Biologist (General), GS-11
Everet C. Jones	Fishery Biologist (General), GS-11
Noboru Tsue (temp.)	Fishery Methods and Equipment Sp., GS-11
Howard O. Yoshida	Fishery Biologist (General), GS-11
Frederic S. Osell	Physical Science Technician, GS-7
Hunt E. Johnsen	Biological Technician (Fisheries), GS-6
Keith S. Chambers (temp.)	Biological Aid (Fisheries), GS-4
Warren T. Maeda (temp.)	Biological Aid (Fisheries), GS-4
Keith A. Tsubata (temp.)	Biological Aid, GS-3

NAME	POSITION TITLE/GRADE
Oceanography Program	
Gunter R. Seckel	Supv. Oceanographer, GS-13
Richard A. Barkley	Oceanographer, GS-14
Betty Ann L. Keala	Computer Programmer, GS-11
Howard N. Morinaga	Physical Science Technician, GS-7
Subpopulations Program	
Kazuo Fujino	Supv. Research Geneticist (Animal), GS-13
Tagay Kang	Biological Lab. Tech. (Microbiology), GS-9
Thomas K. Kazama	Biological Lab. Tech. (Microbiology), GS-9
Lloyd T. Watarai	Biological Lab. Tech. (Microbiology), GS-7
Tuna Ecology Program	
Tamio Otsu	Supv. Fishery Biologist (Research), GS-13
Brian J. Rothschild	Fishery Biologist (Research), GS-14
Bruce E. Higgins	Fishery Biologist (Research), GS-12
Walter M. Matsumoto	Fishery Biologist (Research), GS-12
Richard N. Uchida	Fishery Biologist (Research), GS-11
Ray F. Sumida	Biological Technician (Fisheries), GS-9

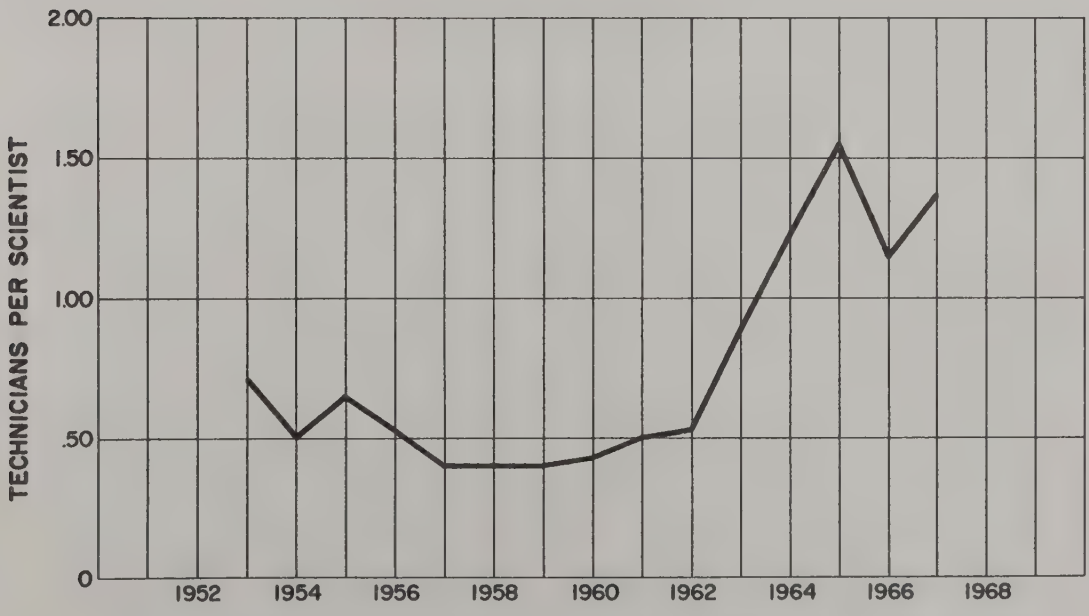
VESSELS AND GEAR SERVICES

William T. Tanaka	Supv. of Vessels Opr. and Maint., GS-12 (Marine Superintendent)
Joan H. Akana	Clerk (General) (Typing), GS-4
Shoji Teramoto	Laborer
R/V Charles H. Gilbert	
Joe Yoshioka	Master-Fisherman
Walter H. Paulo	1st Officer-Fisherman
George S. Iida	Chief Engineer-Fisherman
Haruo Hiyane	1st Assistant Engineer-Fisherman
William M. Pule	2d Assistant Engineer-Fisherman
Robert M. Oka	Leading Fisherman
Katsumi Munetake	Skilled Fisherman
Gregory K. Naliielua, Jr.	Skilled Fisherman
Juan Ramos	Skilled Fisherman
Toyoichi Takasugi	Skilled Fisherman
Raymond N. Fujiwara	Cook-Fisherman
Yasutoku Akamine	Ordinary Fisherman

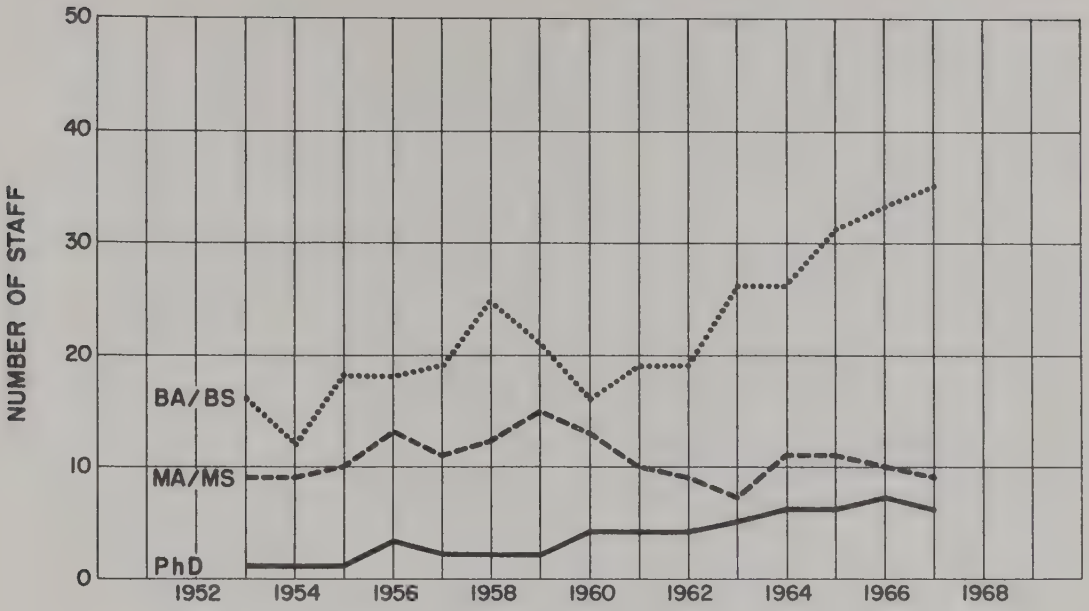
NAME	POSITION TITLE/GRADE
R/V Townsend Cromwell	
Gary H. Miller	Master-Fisherman
Howard W. Kamauu	2d Officer-Fisherman
Rufus D. Pridgen	2d Officer-Fisherman
Masa Yamasaki	Chief Engineer-Fisherman
Richard D. Samuels	1st Assistant Engineer-Fisherman
Charles T. Kelley	2d Assistant Engineer-Fisherman
Shizuo Seki	Electronic Technician/Radioman
Masayoshi Ohara	Leading Fisherman
Isamu Asari	Skilled Fisherman
John F. Johnson, Jr.	Skilled Fisherman
Boyd Keliikoa	Skilled Fisherman
Herman Lariosa	Skilled Fisherman
Richard Y. Suzuki	Skilled Fisherman
Howard C. Lowther	Cook-Fisherman
Thomas W. D. Pang	Cook Helper-Fisherman



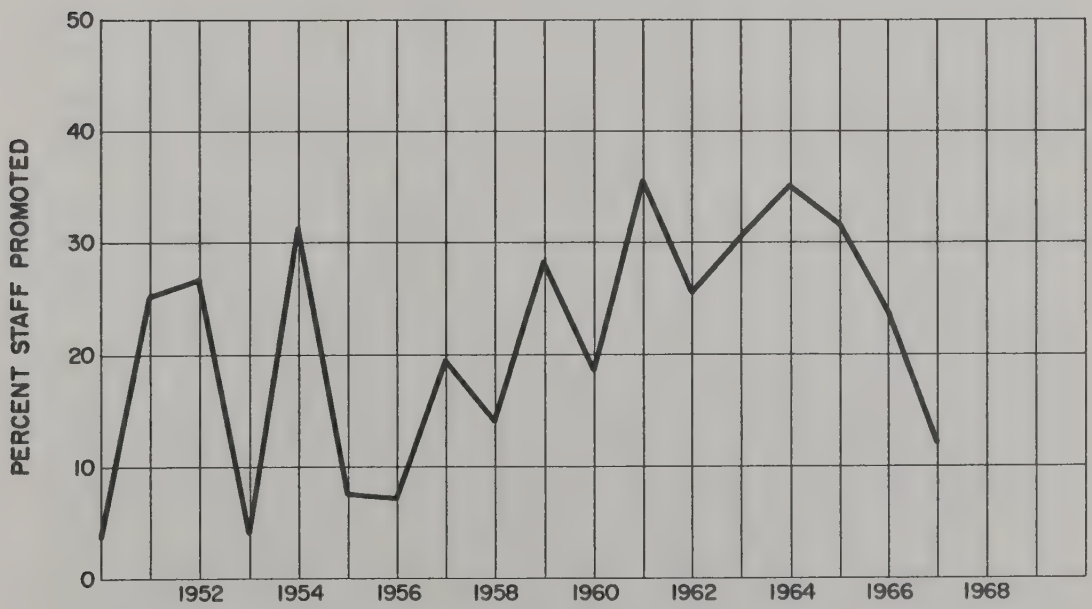
TOTAL AND PERMANENT STAFF, BCF, HAWAII AREA, 1950-67.



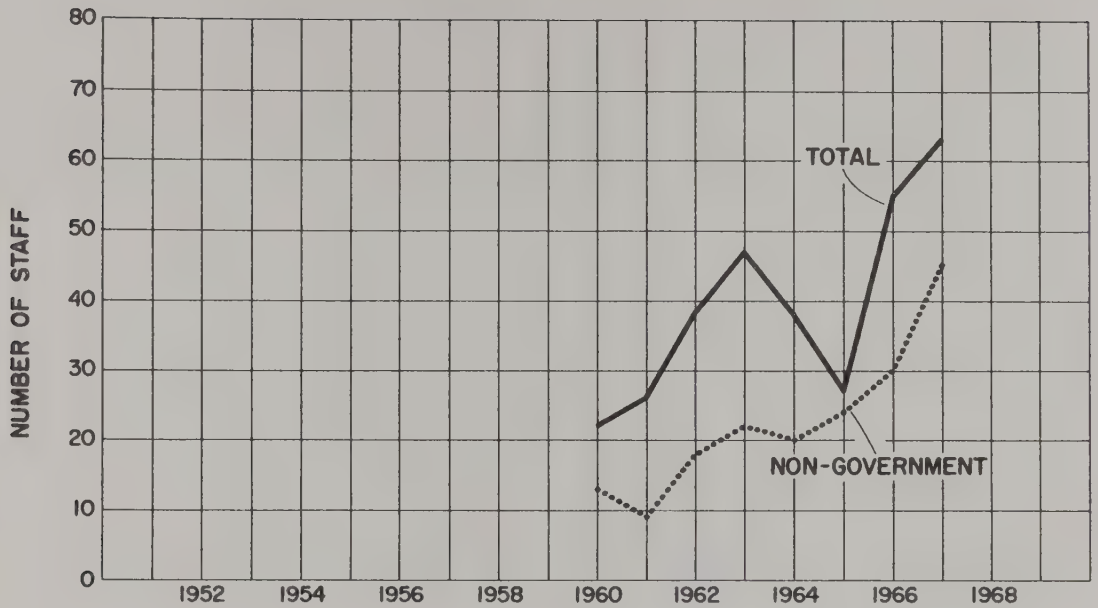
TECHNICIANS PER SCIENTIST, BCF, HAWAII AREA, 1950-67.



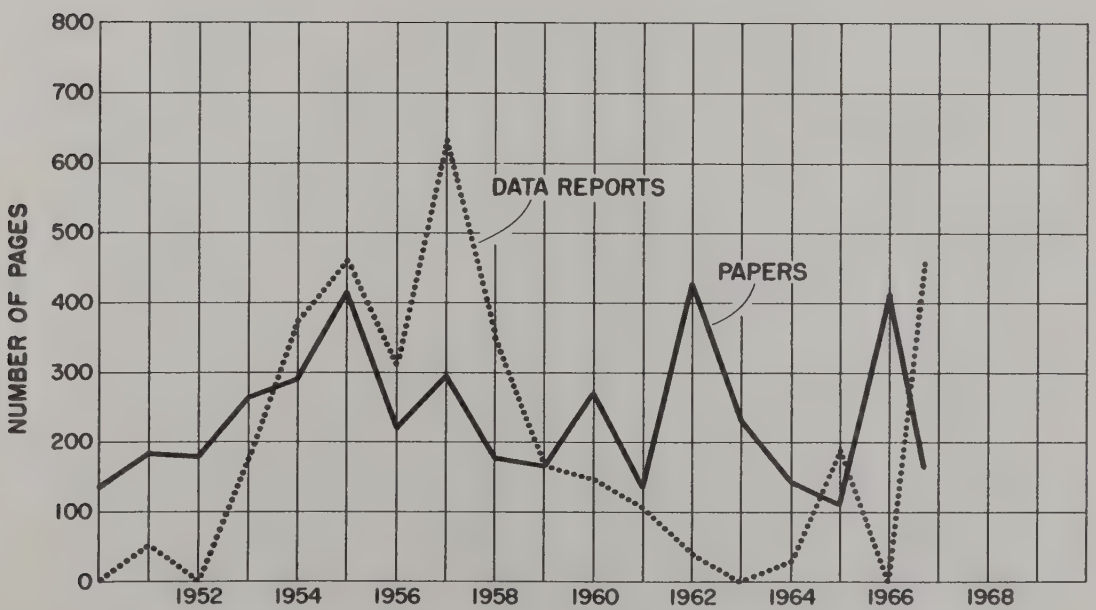
DEGREES HELD BY STAFF MEMBERS, BCF, HAWAII AREA, 1953-67.



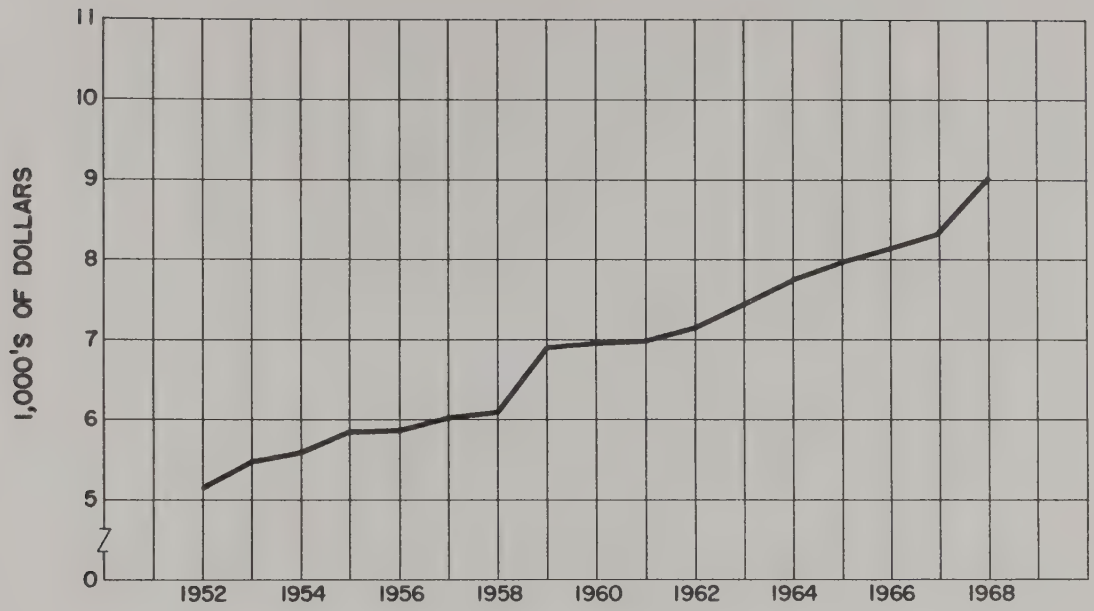
PERCENT OF STAFF PROMOTED, BCF, HAWAII AREA, 1950-67.



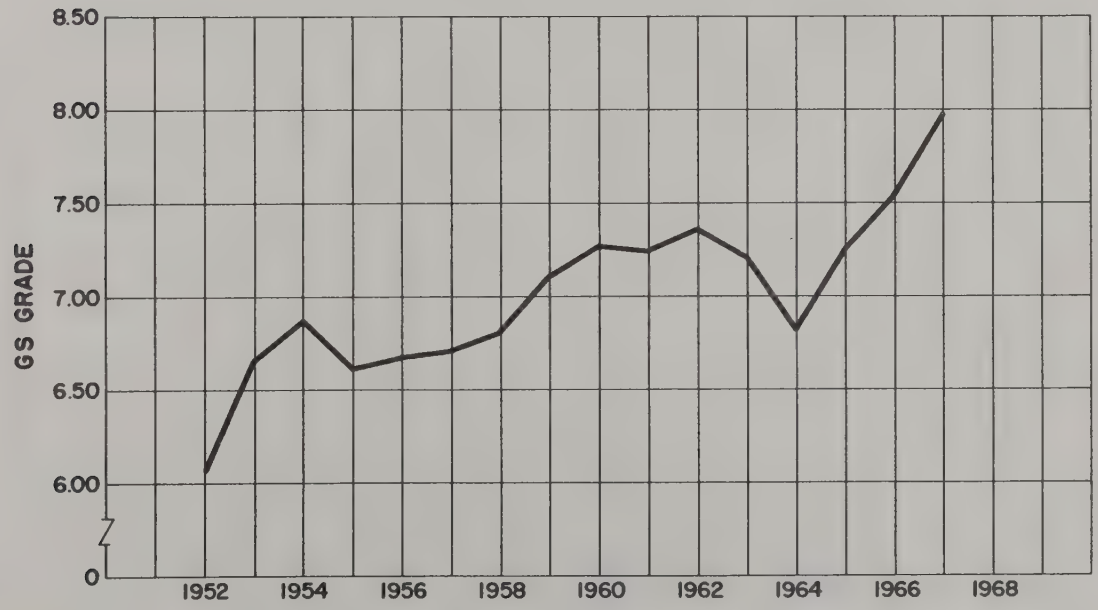
GETA, BCF, HAWAII AREA, 1960-67.



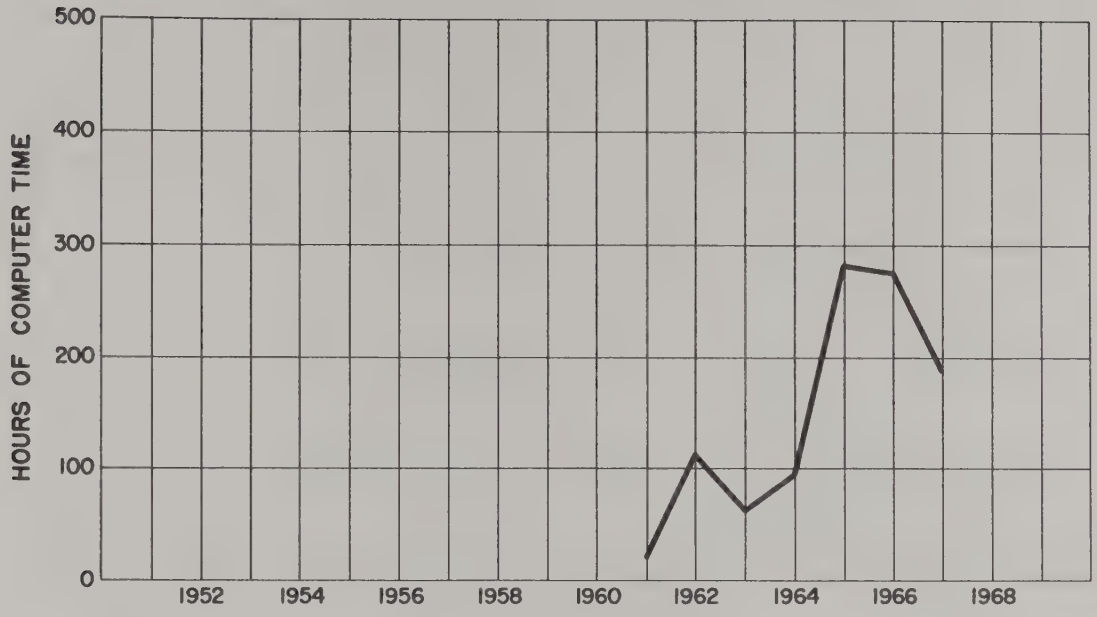
PUBLICATIONS (IN NUMBER OF PAGES) OF BCF, HAWAII AREA, JANUARY 1, 1950 TO NOVEMBER 1, 1967. (PAPERS IN PRESS, 33.)



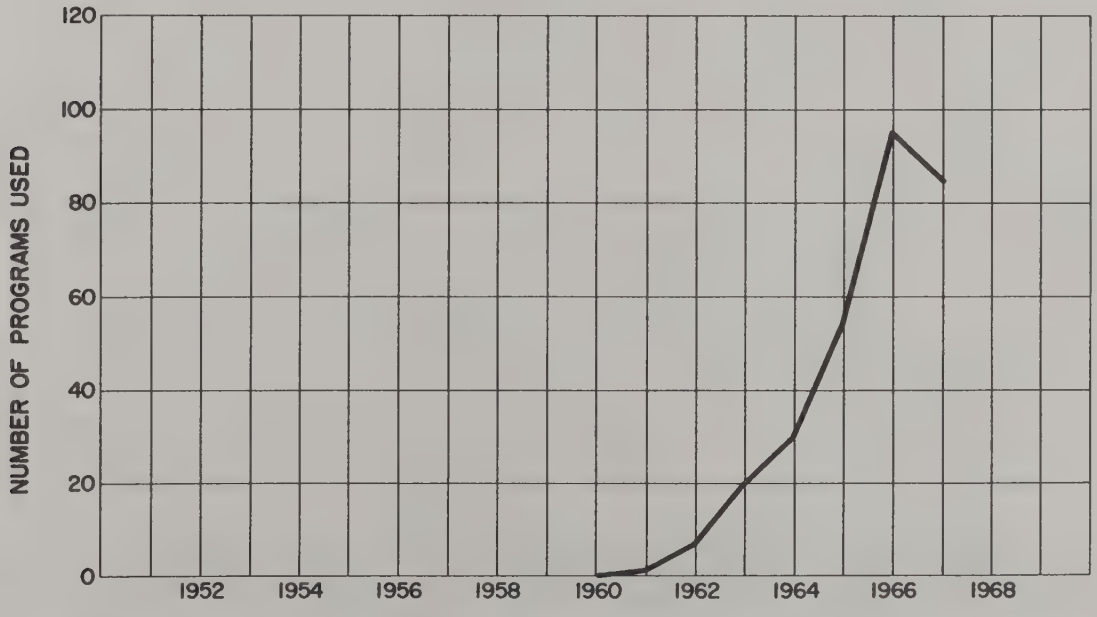
AVERAGE SALARIES, BCF, HAWAII AREA, 1952-67.



AVERAGE GS GRADE, BCF, HAWAII AREA, 1952-67.



HOURS OF COMPUTER TIME, BCF, HAWAII AREA, 1961-67.



NUMBER OF COMPUTER PROGRAMS USED, BCF, HAWAII AREA, 1960-67.

RESEARCH PROGRAMS AND PROJECTS

BEHAVIOR AND PHYSIOLOGY

Proposed allocation, FY 1969		$492,600
Allocation, FY 1968		389,600
Scientific staff (man-years)		5.0
Technicians (man-years)		
Assigned to program	1.5	
From pool	2.1	
		3.6
Total research staff (man-years)		8.6
Ship time (days at sea, CY 1967)		
Charles H. Gilbert		71
Townsend Cromwell		138
Total		209
Publications (1/1/67-12/31/67)		
Published		5
In press		6
Total		11

EUGENE L. NAKAMURA, Program Chief

The Behavior and Physiology Program is investigating (1) characteristics that make live bait effective for the Hawaiian pole-and-line skipjack tuna fishery, and (2) how skipjack tuna are distributed and move in the ocean.

The bait studies are identifying the physical and behavioral features of a good live bait so that an alternate can be selected to supplement or replace the present bait species. A small anchovy, the nehu, is presently used by the fishermen, and about half of the fishermen's time at sea is spent catching the bait. The alternative bait selected must produce as good or better catches than nehu, be less expensive to provide to the fleet, and survive better in baitwells. Observations on the bait and the skipjack's reaction to it are made in a shoreside tank facility at Kewalo Basin and at sea using scuba divers, a sea sled, and underwater viewing ports on research vessels.

The studies of skipjack tuna distribution are conducted with a sophisticated new sonar of continuous-transmission, frequency-modulated design. This equipment on the Townsend Cromwell has the capability of measuring the depth, swimming speed, swimming direction, and the approximate size of fish targets. Eventually it should provide information suitable for identifying the species of fish making up the subsurface targets. Emphasis is presently being placed on the vertical distribution and movement of the skipjack tuna. Future work will also concentrate on developing methods to identify subsurface targets, estimating their biomass, and determining their horizontal concentration on the high seas.

Projects

131.43M	Determine mechanisms affecting the vertical and horizontal distribution of tunas and related species.
131.43P	Investigate physiology of the tunas.
(To be assigned)	Determine alternate live-bait species.

FISHERY DEVELOPMENT

Proposed allocation, FY 1969		$505,700
Allocation, FY 1968		185,900*
Scientific staff (man-years)		4.0
Technicians (man-years)		
Assigned to program	5.0	
From pool	0.8	
		5.8
Total research staff (man-years)		9.8
Ship time (days at sea, CY 1967)		
Charles H. Gilbert		28
Townsend Cromwell		22
Total		50
Publications (1/1/67-12/31/67)		
Published		2
In press		8
Total		10

*Excludes $81,500 from State of Hawaii.

The general objectives of the Fishery Development Program are to (1) enhance existing fisheries of the Hawaii Area, and to (2) develop new fisheries in the tropical and subtropical Pacific.

The present program emphasizes improving the efficiency of the Hawaiian skipjack tuna fishery by developing a separate baitfish capture and holding facility. Elimination of bait scouting and fishing activities by the fishing fleet should increase the skipjack tuna landings by a considerable amount; estimates have ranged as high as 50 percent. The average annual landings for the skipjack fishery today are 10 million pounds. Field experiments indicate that the Hawaiian anchovy (Stolephorus purpureus), which is the principal baitfish species, can be taken in sizeable numbers in fish weirs. Fish weirs made of small mesh netting have been constructed and installed in Kaneohe Bay, one of the two major baiting grounds. The catches have been highly variable, ranging from less than 1 bucket of baitfish (1 bucket holds about 8 to 10 pounds of baitfish) to a high of 100 buckets per night. (By way of reference, an average Hawaiian tuna bait boat carries about 30 buckets of baitfish.)

Work is continuing on this project and efforts are being made to increase the efficiency of the crude weirs presently being used and to determine the cause of the wide fluctuations in catches.

In addition to the work on baitfish, a modest amount of effort is presently directed toward assessing the commercial fishing potentials of the demersal fish and invertebrate resources of the Hawaiian Islands. Bottom trawling with shrimp and eastern otter trawl nets has located large shrimps; however, the hauls made thus far have been too few in number to evaluate properly the commercial potentials of these shrimps at this time. The results have encouraged development of a comprehensive program to study the demersal resources of the entire Hawaiian archipelago.

Projects

131.110A	Explore fishery and research applications of submarines.
(To be assigned)	Increase efficiency of Hawaiian skipjack fishery.
(To be assigned)	Increase efficiency of Hawaiian longline fishery.
(To be assigned)	Develop high-seas tuna fishery.
(To be assigned)	Develop fisheries for non-tuna resources.

OCEANOGRAPHY

Proposed allocation, FY 1969		$106,600
Allocation, FY 1968		230,400*
Scientific staff (man-years)		2.0
Technicians (man-years)		
Assigned to program	2.0	
From pool	0.5	
		2.5
Total research staff (man-years)		4.5
Ship time (days at sea, CY 1967)		
Charles H. Gilbert		30
Townsend Cromwell		-
Total		30
Publications (1/1/67-12/31/67)		
Published		9
In press		3
Total		12

*Excludes $30,000 from Atomic Energy Commission.

GUNTER R. SECKEL, Program Chief

The association between a population of pelagic marine fish and its environment occurs on a variety of distance and time scales, ranging from a few feet for visual responses to thousands of miles for major oceanic

water mass or current systems; from seconds to years or even centuries, as in the case of genetic response to climatic changes.

The Oceanography Program is examining the marine environment at three different levels of scale and detail: an oceanwide study of climatic properties and currents; a medium-scale study of seasonal and shorter-term changes in the trade wind zone of the central North Pacific, and a small-scale study of transient phenomena within the Hawaiian Islands.

The Pacific-wide research effort has resulted in an atlas summarizing the average distributions of properties, based upon some 60,000 oceanographic stations collected during the past 50 years. This is the most detailed climatic summary ever produced for any ocean. The same data are now being used to determine the average three-dimensional structure of the ocean currents north of 20° S., and the statistical properties of the station data are being examined in some detail as well.

Work on the trade wind zone project has resulted in a 16-month pilot study of processes (mixing, advection, heating and evaporation at the sea surface, for example) which determine and control, on a month-to-month basis, the temperature, salinity, and currents in an area equal in size to the U.S. east of the Mississippi. The time and distance scales of the trade wind zone project are an order of magnitude finer than those for the oceanwide atlas.

Studies of the details of the currents around the Hawaiian Islands have resulted in two alternative hypotheses to account for the "island effects." It appears that the islands either act as individual barriers to the flow, each generating a periodic wake of eddies moving downstream; or the entire group acts rather like an aeroplane wing, generating an elongated counterclockwise circulation centered on the axis of the island group and remaining more or less fixed in place. Counterclockwise circulation in either hypothesis would result in divergence and enrichment of the surface layer, so the total enrichment could vary from year to year if (a) the number of eddies generated each year in the wakes varied, or (b) the strength of the circum-island circulation varied from year to year. Either variation would depend upon the strength of the central clockwise gyre in the North Pacific.

Projects

131.99C	Study association between trade wind system and North Pacific oceanographic climate.
131.99D	Investigate seasonal variations, surface water types, Hawaiian area (Koko Head).
131.99F	Conduct pilot study of limited portion of TWZO area (data and descriptive reports).
131.99G	Analyze and publish basic data from pilot study (analytic studies).

131.8B Determine average annual and seasonal Pacific oceanographic conditions [Atlas].

131.8C Investigate factors determining distribution of physical and chemical properties of the Pacific Ocean.

131.8D Some aspects of the physical oceanography of the western Pacific.

SUBPOPULATIONS

Proposed allocation, FY 1969		$199,500
Allocation, FY 1968		191,500
Scientific staff (man-years)		1.0
Technicians (man-years)		
Assigned to program	3.0	
From pool	1.0	
		4.0
Total research staff (man-years)		5.0
Ship time (days at sea, CY 1967)		
Charles H. Gilbert		30
Townsend Cromwell		2
Total		32
Publications (1/1/67-12/31/67)		
Published		1
In press		2
Total		3

KAZUO FUJINO, Program Chief

The Subpopulations Program concentrates on the study of the population structure of skipjack tuna in the Pacific Ocean. Since some skipjack tuna are known to perform long migrations (from the eastern Pacific to Hawaii) a Pacific-wide study has been planned. As a part of this project our Program has participated in the Cooperative Study of the Kuroshio Current and Adjacent Waters (CSK) to study skipjack tuna subpopulations in the western Pacific, under an agreement reached at the Joint IPFC/IOC Meeting, Honolulu, 1966.

Using inherited characteristics, that is, blood groups and serum groups, it was found that at least one skipjack tuna subpopulation which is clearly distinguishable from the skipjack tuna that appears in Hawaii and the eastern Pacific, exists in the western Pacific.

Another function of the Program is to serve as a Blood Group Center; serum, blood specimens, and information have been exchanged between our Laboratory and the Laboratories of the BCF's Fishery-Oceanography Center, Inter-American Tropical Tuna Commission, and Tokai Regional Fisheries Research Laboratory, Japan.

To accomplish the goal of defining the subpopulation structure of tunas in the Pacific Ocean, further data on genetic traits will be accumulated from various areas of the Pacific to understand better the relations of population structures (1) between Palau and Japan, (2) between Hawaii and the eastern Pacific, and (3) between the northern and southern sectors of the central Pacific Ocean. This work will be undertaken in cooperation with various laboratories in the United States and Japan. The results will contribute to understanding the ecology of skipjack tuna better and to improving estimates of parameters in stock assessment for increasing catches and rational utilization of the skipjack tuna resources of the Pacific.

Projects

131.47D Investigate tuna subpopulations through the use of blood groups and inherited proteins.

131.47E Provide for activities of Tuna Blood Group Center.

131.47F Investigate the genetics of fishes.

TUNA ECOLOGY

Proposed allocation, FY 1969		$332,400
Allocation, FY 1968		359,600
Scientific staff (man-years)		4.0
Technicians (man-years)		
Assigned to program	1.0	
From pool	4.0	
		5.0
Total research staff (man-years)		9.0
Ship time (days at sea, CY 1967)		
Charles H. Gilbert		43
Townsend Cromwell		69
Total		112
Publications (1/1/67-12/31/67)		
Published		4
In press		3
Total		7

TAMIO OTSU, Program Chief

The Tuna Ecology Program conducted work during the summer of 1967 on (1) an operations analysis of the Hawaiian skipjack tuna fishery and (2) the study of the relation between skipjack tuna and their environment. These studies were directly aimed toward obtaining information that will aid in the optimum development of the Hawaiian skipjack tuna fishery. With the cooperation of the fishing vessel operators, observers were placed on seven commercial vessels during the summer to make detailed observations

on all aspects of the fishing operation. Environmental data were also obtained by these observers. The data collected by the observers should reveal limitations and shortcomings in present practices, and provide a basis for suggesting improvements. The analysis of the environmental data should provide information that will permit fishermen to more readily locate the more productive fishing grounds.

The Tuna Ecology Program has continued to operate the sampling stations in Koror, Palau, and in Pago Pago, American Samoa. In Palau, biological data are being obtained on the skipjack tuna landed by the Okinawan vessels as well as on the baitfish used to capture the skipjack. In American Samoa, detailed data on the size and sex of the albacore landed by the tuna longline fishery, as well as catch and effort data, are being collected. These data enable us to keep abreast of the developments in the fisheries based in those areas.

Recently, we began a skipjack and yellowfin tuna tagging program in Palau through the cooperation of the Government of the Trust Territory. We have arranged to have one of our men do the tagging every other week on the Trust Territory's fishing vessel, the Emeraech.

Other major projects of the Tuna Ecology Program include the continued analysis of the data from the Hawaiian skipjack tuna fishery and from our sampling stations in Palau and American Samoa. A large midwater trawl (Anchovy No. 2 Cobb Pelagic Trawl) was used during the summer of 1967 in an attempt to collect juvenile tunas. Large numbers of larval and post-larval tunas of several species were taken in the trawls but no juvenile skipjack larger than 48 mm. was taken. One objective of the project (which therefore went unfulfilled on this first trial) was the collection of blood samples from juvenile skipjack for subpopulation studies. On the other hand, whole specimens as well as eye lenses of several species of post-larval tunas were collected for electrophoretic analysis to advance our identification techniques. This is in line with our efforts to resolve certain differences in larval tuna identification which now exist between us and scientists of the Japanese Far Seas Fisheries Research Laboratory.

The greatest effort in the future will lie in projects that will directly assist in the optimum development of the skipjack tuna fishery since this is the species which holds the greatest potential for increased yield. We will thus continue our summer skipjack tuna fishery observational program for the next two summers. We are hopeful that we will be able to recommend changes to improve the efficiency of the Hawaiian skipjack fishery. We will continue to study the relationship between skipjack and environment so that we may be able to direct fishing vessels to more productive grounds on the basis of environmental data. This would eliminate much of the present "nonproductive," time-consuming scouting operations.

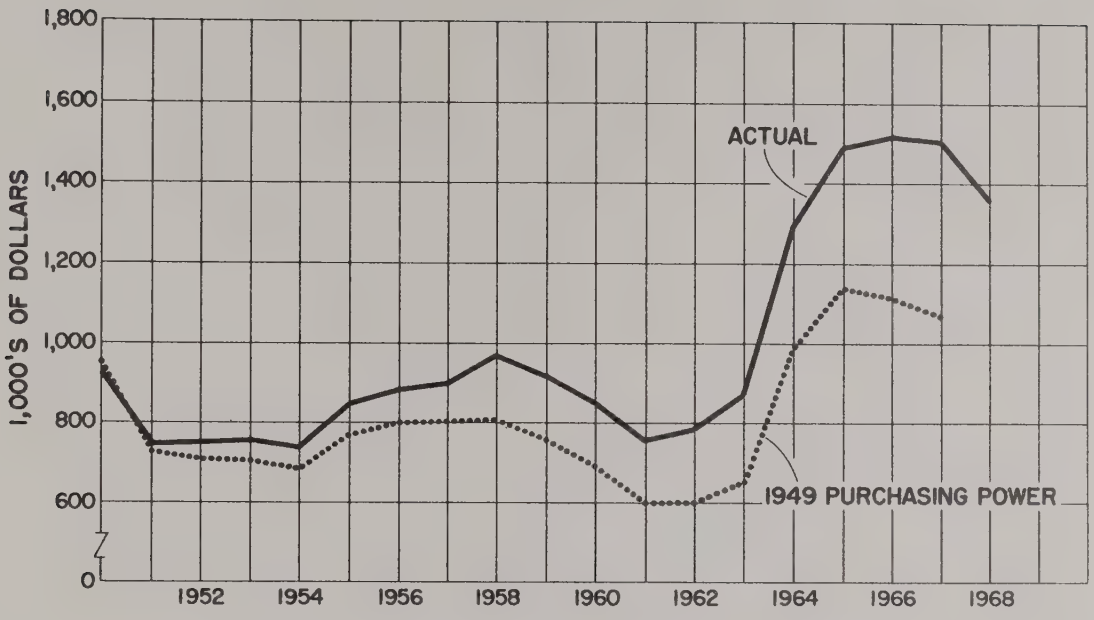
We plan to increase our tagging effort both in Palau and here in the Hawaiian fishery in order to test present working hypotheses on the skipjack tuna subpopulation structure and movements. These experiments should provide some of the basic information needed to maximize the yield of the skipjack tuna resource(s) in the Pacific Ocean. Of importance, also, is the work at the sampling stations, which permit us to "monitor" the developments in the fisheries based in Palau and in Samoa.

Projects

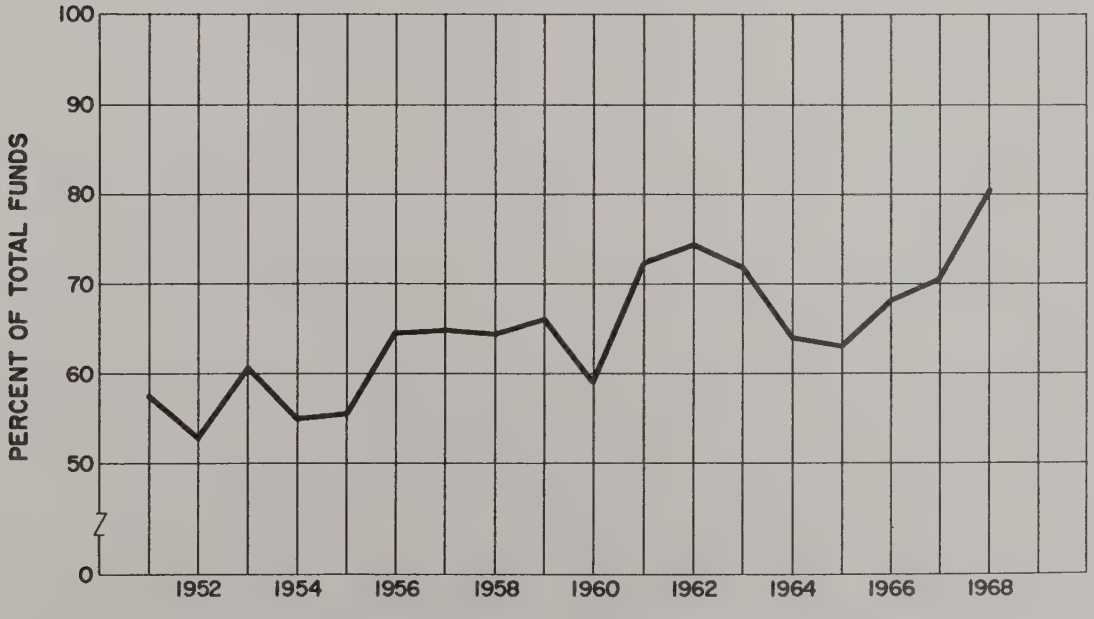
131.45I	Investigate population dynamics of albacore.
131.44B	Investigate population dynamics of skipjack in Hawaiian waters.
131.44D	Investigate systematics and ecology of tuna larvae and juveniles.
131.44G	Investigate tuna resources of the Trust Territory.
(To be assigned)	Develop techniques for capturing juvenile tunas.
(To be assigned)	Assessment of central Pacific tuna resources.

OTHER APROPRIATIONS

	FY 1968	Proposed, FY 1969
Administrative expenses, Fisheries Loan Fund	$3,000	$ 3,000
(Total loans: $205,068)		
Program administration, Federal Aid for Research and Development (P.L. 88-309)	3,000	5,000
Project totals:		
Hawaii $265,034		
Guam 104,000		
American Samoa 104,942		
Marketing and technology (Fishery Statistics)	2,000	2,000
	$8,000	$10,000



FUNDING OF BCF, HAWAII AREA, FY 1950-68.



PERCENT OF TOTAL FUNDS OBLIGATED FOR SALARIES,
BCF, HAWAII AREA, FY 1951-68.

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FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Oceanography

Period Covered: January, February, March 1967 (FY-67)

Program Leader: Richard A. Barkley Date APR 28 1967

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

Regional Director/Area Director: Acting R. S. Shomura Date _____

Branch Chief: J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Pacific-wide quarterly charts of geostrophic topography and integrated mass transports have been plotted and partially contoured. These are the first of a series of such charts which ultimately will provide detailed internally consistent values of currents and mass transports in three dimensions for the Pacific north of 20°S, the first such information ever available for any of the world's oceans.

Statistical studies making use of the Atlas data have progressed to the point where frequency histograms are now available for five sigma-t surfaces. These provide a critical test of Sverdrup's water mass curves, which may be revised to better fit the data which have become available since Sverdrup published his analysis. The data may also provide valuable information on the mixing processes which take place at water mass boundaries.

The manuscript on the Kuroshio-Oyashio front has been sent off for journal publication. More recent research has revealed a number of instances of thermal fronts similar to those reported in that MS, but at widely different latitudes. The phenomena in question, which resemble von Karman vortex streets, have been observed not only off Japan, but near the Azores, Madeira, and the Gilbert and Marshall Islands. The hypothesis that all oceanic islands generate vortex streets is being examined, and will probably be tested by field work west of Johnston Island next spring.

The materials for the "Oceanographic Atlas of the Pacific" will be ready for the University of Hawaii Press soon, probably by the end of April.

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UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Oceanography

Project Title: Determine average annual and seasonal Pacific oceanographic conditions (131.8B)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Richard A. Barkley Date APR 28 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

destination potentials (analogous to dynamic heights), and integrated mass transport functions from the Atlas data have been computed, plotted, and publication prepared. The result will be a set of charts showing geostrophic currents and integrated transport at several levels in the upper 1,000 meters or so in the Pacific south of lat. 20°N. The choice of reference levels presents a problem. Thus far, attempts to use the 1,200 decibar level as a reference have yielded results which resemble similar charts at the sea surface rather than the oceanographic literature, which are based on far fewer observations. However, the patterns of flow which result from the choice of a 1,200 db reference level do not appear entirely realistic. For example, the flow on the 26.60 sigma-t surface, relative to 1,200 db, could not possibly yield the observed distribution of salinity on this same sigma-t surface, except in the grossest sense. It may be that the use of a reference surface which varies in depth with latitude, such as that used by Defant in the Atlantic, will produce better results.

Mr. Taylor has virtually completed the final drafting of the charts for the "Oceanographic Atlas of the Pacific." The completed charts are now being given a final check, by comparing them with the original plotted numerical values. The Atlas should be ready for the University of Hawaii Press about the end of April.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: [illegible]

Program Title: [illegible]

Project Title: [illegible] and chemical properties of the Pacific Ocean (BCF)

Period Covered: January, February, March 1967 (QR-67)

Project Leader: Richard A. Barkley Date

STATEMENT OF PROJECT ACCOMPLISHMENT

[illegible] have completed of the familiar-style frequency distributions of salinity on 5 sigma-t surfaces, 26.00, 26.60, 27.00, 27.20 and 27.40, as preliminaries to an extensive set of statistical analyses of the Atlas data. In addition to summarizing the data from 50,000 stations in a single table, [illegible] plots the cumulative frequency distributions on probability paper for graphical analysis. From [illegible] some of the distributions seem to fit the [illegible] quite closely, which perhaps for the Lomonosov Water that. In [illegible] there are [illegible] due to the effects of mixing of small [illegible] with unusually high or low salinity, with large volumes of [illegible] salinity. It seems likely that the numerical frequency distributions can be made to yield significant information on the mixing processes [illegible] in this rule laboratory, assuming that an appropriate mathematical model can be discovered or invented for this purpose.

[illegible] on the Australia-Cyprus front has been sent to the Journal of Marine Research. As has reported previously, this paper deals with the eastward-moving [illegible] [illegible] [illegible]

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FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or
Office of Origin [illegible]

Region or Area [illegible]

Program Title Behavior-Physiology

Period Covered [illegible] (F.Y. 67)

Program Leader John J. Magnuson Date APR 28 1967

Reviewed by:

Chief, Field Station
or Office of Origin _____ Date _____

Acting
Regional or Area Director [illegible] Date APR 28 1967

Branch Chief J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

In direct attempts to determine the qualities of a good bait species, several kinds were observed into the Kewalo tanks and observed. Worthy of note was the marked difference in the behavior of nehu (the most popular bait species in the fleet) from the other species.

The behavior of skipjack was also observed at sea from a sea sled submerged behind the CHARLES H. GILBERT. From 150 feet behind the vessel they were observed as deep as 40 feet below the sea surface.

The sea sled appears to be a feasible tool to observe the behavior of skipjack bait at sea.

The number of targets found with the CETI sonar does not increase, when ship speed is increased from 4 knots, to 8 knots. Scanning abilities of the sonar have been increased by modifications from full scan capabilities at 4 knots, to full scan capabilities at 7 knots, and partial scanning abilities up to 11 knots. This performance is still below those specified in the contract.

Spare parts for the sonar have been obtained and most malfunction should be repairable at sea this year.

...acer (DRT) which plots the ship's track has been instal...

...t wavyback skipjack can swim is determined by th...
... produce at various speed to overcome their weight ...
... changes with body size (speed = 10 lengths $^{1/2}$).

... been developed to determine ...

Hearing threshold data is now complete for one wavyback skipjack. ... second fish is being tested.

... (U. of Mich.) ... to the Laboratory ... diffraction. ... were obtained from the salt water aquaria.

Manuscripts published:

1966. Magnuson, John J. Continuous locomotion in scombrid fishes /Abstract/ Amer. Zool. 6(4): 503-504

1966. Murchison, A. Earl, and John J. Magnuson. Notes on the coloration and behavior of the common dolphin, Coryphaena hippurus. Pac. Sci. 20(4): 515-517.

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UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin [illegible] Laboratory, Honolulu

Region or Area [illegible]

Program Title [illegible]

Project Title Investigations responses of fishes to underwater sound (131.412)

Period Covered January, February, March 1967 (FY 67)

Project Leader Robert T. B. Iversen Date APR 28 196[illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

[illegible] of a second Euthynnus affinis (45 cm.) to an underwater sound [illegible] was begun to bring this subject to the level of training necessary for hearing threshold experiments.

[illegible] thresholds at 700, 800, 900, 1,000, and 1,100 cps. were obtained by [illegible] for the first E. affinis (40 cm.) prior to its death in February. The final mean hearing threshold values for this fish are as follows:

[illegible]	Mean threshold (dB/ 1 microbar)	N
[illegible]	+39	2
[illegible]	+17	2
[illegible]	+14	2
[illegible]	+10	3
[illegible]	+ 8	2
[illegible]	+ 8	2
[illegible]	+ 5	3
[illegible]	+16	3
[illegible]	+21	3
[illegible]	+27	3
[illegible]	+31	3

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UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Investigate visual acuity in tunas and related species (151.43E)

Period Covered: January, February, March 1967 (FY 67)

Project Leader: E. L. Nakamura Date: APR 28 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Experiments with a yellowfin tuna were discontinued because the yellowfin developed gill ectoparasitism and, consequently, the experimental results became unreliable.

The manuscript on visual acuity of skipjack and little tunny was returned from the publishers with minor critiques. However, before submitting the manuscript to a journal, revision may be necessitated by a 1966 publication which was previously unknown to the author. This 1966 paper (in German) concerns the change of visual acuity with growth in a cichlid.

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UNITED STATES DEPARTMENT OF THE INTERIOR
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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Investigate feeding of tunas and related species (131-431)

Period Covered: January, February, March 1967 (FY 67)

Project Leader: John J. Magnuson Date

STATEMENT OF PROJECT ACCOMPLISHMENT

As an aid in identifying the steps required to develop an alternate bait species for use in Hawaii's fishery for skipjack, a flow chart was developed showing interrelationships between the different steps. The chart will be modified to identify critical portions of the process and to assign completion dates and priorities to the various stages.

Preliminary observations to determine the qualities of a good baitfish were continued by Iverson, Gooding, Johnsen, and Richards. For example, the behavior of nehu (Stolephorus purpureus), mosquito fish (Gambusia sp. and others) and tilapia (Tilapia mossambica and T. mossembica) were observed when they were changed into 5-gallon containers containing three Euthynnus affinis. Results are summarized below. Mostly of note is the marked difference in the behavior of the nehu from the other three species.

Species	Behavior when thrown into water	Behavior when attacked by Euthynnus affinis
Nehu	Remained within several inches of water surface.	Obvious escape behavior including skipping over water surface and dodging. Ended up at wall of tank.
T. mossambica	Sounded rapidly to bottom.	Some increase in rate of sounding.

	Behavior when thrown into water	Reaction when attacked by [illegible]
T. macrocephala	Sounded rapidly to bottom.	Some dodging.
Mosquito fish	[illegible]	Little or no response.

[illegible] behavior of nehu were also made at [illegible] to [illegible] the feasibility of using a sea sled with [illegible] fitted to [illegible] fishing vessel. [illegible] 16 mm. movie film) swimming downwards at angles [illegible] in schools of 5 to 10 individuals swam downward in the above [illegible]. The schools of nehu were more prominent than the single nehu in the [illegible]. Two individuals did not swim downwards, but swam horizontally at the [illegible] just below. The silveryness of the nehu was more noticeable on the [illegible] observer's comments, but this may be due to the fact this was [illegible] made such observations.

[illegible] that simulated chasing a school of skipjack, the sea sled with pilot [illegible] successfully towed on the surface at speeds up to 9 knots. When [illegible] vessel was contacted, the vessel slowed to 1.5 to 2 knots, the [illegible], bait was chummed, and films were taken. These tests were conducted [illegible] to about 2-1/2 with swells of 4 to 5 feet. The sea sled was [illegible] the cooperation of the BCF Exploratory Fishing and Gear Research [illegible].

[illegible] one day at sea with Dr. Kenneth Norris, Professor of Zoology at [illegible] the use of Dr. Norris' mobile observation platform which is [illegible] the natural behavior of cetaceans at sea. This vehicle is made [illegible] aircraft fuel drop tank that has been modified to contain a caisson [illegible] allowing a 360° view about 3 feet below the surface of the water. [illegible] observations in a dry environment, and is towed by a mothership. Its [illegible] for use in observing baitfish behavior at sea is its stability [illegible].

[illegible] programs for a number of laboratory personnel were completed prior [illegible] sled tests. There are now 7 [illegible] qualified scientific personnel at [illegible]. John J. Naughton, Fisheries Technician, has been named Diving [illegible] supervisor to coordinate future use of SCUBA at the Laboratory.

Manuscript submitted to journal:

[illegible], John J. Swimming activity of Pontoporeia affinis as related to food search. Bulletin of Marine Science.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Investigate comparative and descriptive anatomy of tunas and related species (131.43K)

Period Covered: January, February, March 1967 (FY 67)

Project Leader: Eugene L. Nakamura Date

STATEMENT OF PROJECT ACCOMPLISHMENT

A radiographic technique for determining gas bladder volumes of large fish was found to give dependable estimates when checked against a water displacement method. The bladders were X-rayed in the whole fresh fish from a dorsal and lateral view, they were then geometrically reconstructed assuming that cross sections through the bladder were ellipses and the end were ellipsoidal cones. The volume was then computed for the geometrical shape.

Manuscript - first draft completed:

Chang, Randolph K. C. and John J. Magnuson. A radiographic method for determining gas bladder volume from large fish.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Investigate behavior and ecology of animals associated with floating objects at sea (131.43)

Period Covered: January, February, March 1967 (FY 67)

Project Leader: Reginald M. Gooding Date

STATEMENT OF PROJECT ACCOMPLISHMENT

The only work that remains to be done on this project is a paper which will be entitled "Some aspects of the ecology and behavior of the nomid fish, Psenes cyanophrys" and a note on "Agonistic behavior of pilot fish, Naucrates ductor observed at sea." Nothing has been done on these during the quarter.

Field Station or
Office of Origin Biological Laboratory, Honolulu

Geographic Area Hawaii

Program Title

Project Title Determine mechanisms affecting the vertical and horizontal distribution of tuna and related species (1H1.4.3)

Period Covered January, February, March 1967 (FY 67)

Project Leader Heeny S. H. Yuen Date APR 28 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

During the quarter Straza Industries made two attempts to improve the scanning performance from 4 knots to 12 knots. The first attempt was a changing of the wire within the motor from d.c. to a.c. The second was a redesign of the power amplifier for the a.c. motor. Both attempts failed to obtain the 12 knot abilities. As it now stands, full scanning performance is possible through 7 knots. At 8 knots scan will not operate at relative bearings of 90° and 270° at tilt angles 0°-10°. Scanning is normal otherwise. At 10 knots the limitations of 8 knots are extended to greater tilt angles, 0°-35°. Scanning is available at the same tilt angles provided the scan does not have to reverse itself at 90° and 270° relative bearing. At full ship's speed of 11-1/2 knots only a 12° scanning sector is possible at all tilts between 260° and 80° relative bearing.

During profile 29 of the TOWNSEND CROMWELL several tests were made to determine the effect of speed on sonar operations. In a sea state of 1 the increase in noise level with speed should reduce effective range by 25 percent at 8 and 10 knots and 40 percent at 11-1/2 knots. In a sea state of 2, effective range should be reduced by 25 percent at 6 knots and 40 percent at 8 knots and greater. A continuous target 90 m. below the surface was detected by sonar 92 percent of the time when the ship went by at 4 and 6 knots and 83 percent of the time at 8 knots. The effects of speed on the rate of contact with natural targets during sonar scanning were also examined. In one test the number of targets found per unit of time at 4, 6, and 8 knots were alike; in another test the number found at 4 knots was significantly greater than the number found at 6 knots.

Apparently the rate of contact does not increase with an increase in ship speed.

Spare parts for the sonar have been received and stored on the CRONKHILL. Most malfunctions, should they develop, will now be repairable at sea.

A dead reckoning tracer (DRT) which plots the ship's track while the ship is under way was installed on the CRONKHILL. A converter of gyrocompass signals is still needed to make it fully operational.

Requirements of a system for recording sonar data were drawn up. Actual procurement procedures should begin shortly.

QUARTERLY PROJECT PROGRESS REPORT

Program Title Fisheries-Physiology

Project Title Determine patterns and factors controlling movements of tunas and related species (131.43N)

Period Covered January, February, March 1967 (FY67)

Project Leader Haeny S. H. Yuen Date APR 28 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

The relation between the minimum possible swimming speed and length of wavyback skipjack (Euthynnus affinis) was computed from an understanding of the mechanism by which forward movement keeps the fish from sinking, and from morphological and behavioral data. The relationship was speed = 10 lengths $^{1/2}$. Speed required to keep from sinking, then increases with body length, but speed relative to body size (i.e., body length/sec) decreases. The table below shows some points along the graph.

Computed minimum speed of wavyback skipjack

Speed	fork length (cm) 30	50	70
cm./sec.	53	68	81
body length/sec.	1.8	1.4	1.2

These speeds are about 1.5 body lengths per second lower than the maximum speeds that other species such as sockeye salmon can maintain for at least 1 hour.

Current loading of the pectoral fins of wavyback skipjack (i.e., mass carried per unit area of lifting surface) is an order of magnitude greater than for bird and insect wings. To obtain sufficient lift in air, birds and insects require larger lifting surfaces because air is less dense than sea water.

[illegible] Program (131.43N) - continued.

[illegible]

[illegible]:

[illegible], John J. Hydrostatic equilibrium of a pelagic teleost without a gas bladder, the waryback skipjack (Euthynnus affinis)

[illegible]:

[illegible], Thompson, John J. Continuous locomotion in cetacean fishes. /Abstract/ American Zoologist 6(4): 503-504

[illegible], Hamilton, A. Earl and John J. Thompson. Notes on the coloration and behavior of the common dolphin (Tursiops truncatus). Fac. Sci. 2(4): 513-517

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin Biological Laboratory, Honolulu

Region Area Hawaii

Program Title Behavior-Physiology

Project Title Investigate physiology of the tunas (131.43P)

Period Covered January, February, March 1967 (FY 67)

Project Leader John J. Magnuson Date APR 28 19

STATEMENT OF PROJECT ACCOMPLISHMENT

Dr. John Fordtran (University of Michigan) spent 6 weeks at the Laboratory studying olfaction in tunas. He developed a method to record slow potential from the olfactory rosette in skipjack tuna (Katsuwonus pelamis). On some occasions nerve potentials were also observed. The skipjack were tranquilized and held in a small tank on the laboratory table. The olfactory capsule was opened and the electrode was inserted into the rosette. Odors used were from tuna and squid.

Work was also begun to determine the time and distance intervals that are required for a skipjack skipjack (Euthynnus affinis) to determine a gradient of food odor. Dye flow were made of the way an odor would be expected to circulate through the large tanks (dye was used). The paths of the fish when odor is introduced will be compared with the location of the odor as judged from the dye.

Manuscripts

Submitted to summer AIBS Meeting.

Dahm, Phyllis H. Some observations on the schooling of tunas. [Abstract]

Accepted for publication:

Royce, Martin D. and Mary J. Keenan. The role of red and white muscles in the swimming of skipjack tuna. Nature.

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File No.

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Pacific

Program Title: Ecological-Taxonomic Studies

Period Covered: January, February, March 1967 (FY-67)

Program Leader: Peter J. Struhsaker

Reviewed by:

Chief, Field Station or Office of Origin: _____ Date: _____

Area Director: _____ Date: _____

Branch Chief: _____ Date: _____

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Skipjack-Yellowfin Ecology

Project Title: Investigate ecology of skipjack and yellowfin (511.41)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Brian J. Rothschild Date APR 25

STATEMENT OF PROJECT ACCOMPLISHMENT

Preparations were made for a short cruise to gain proficiency in handling, maneuvering our new midwater trawl. A floating night light was made for [illegible]. Our intent was to maneuver the trawl under the night light to see whether increased catches could be made. Unfortunately the trawl was severely damaged after only one tow. Inspection of the net showed that it had not been manufactured according to specifications.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Skipjack-Yellowfin Ecology

Project Title: Investigate population dynamics of skipjack in Hawaiian waters (131.443)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Brian J. Rothschild Date

STATEMENT OF PROJECT ACCOMPLISHMENT

During the quarter, analysis of oceanographic data collected in the 1951-53 [illegible] exploratory and monitoring survey cruises was begun. The available data included surface temperature, surface salinity, surface phosphate, and depth of mixed layer. The catch per effective trip for 10-day intervals for all principal fishing areas in Hawaiian waters for the 1955-58 period was also obtained. Preliminary analysis of the data suggested that the catch per standard effective trip increased appreciably in waters where the salinity was below 34.80/oo. The mutual relationship among average surface temperature, average salinity, average depth of mixed layer, and catch per standard effective trip was investigated by multiple regression analysis.

Some time was spent on designing a project for placing observers on several skipjack sampans for observing and recording data pertaining to operations presently in the aku fleet.

The Hawaiian skipjack catch for the first quarter of 1967 was estimated at [illegible] pounds, which is 77,492 pounds below the 1960-1966 average for the same period.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Pelagic Fisheries Biology

Project Title: Investigate systematics and ecology of tuna larvae and juveniles (231.44)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Walter M. Matsumoto Date: APR 28 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

During the quarter larval skipjack and juvenile catches were standardized to surface tows by 5° square and quarters of the year. The standardized catches were analyzed arithmetically. In order to improve on the sampling system, the method of ratio estimators was used on all surface catches. Initial computer output of the ratio-estimate method showed inadequate coverage in the subsystem for some strata. Although the estimate becomes less reliable as sample size decreases, it nevertheless provides us with at least a rough idea of the temporal and spatial distribution of tuna larvae.

Correlation coefficients between larval catch and surface temperature and between larval catch and surface salinity were calculated for Hawaiian and equatorial waters. The calculations were made by months for the sparsely sampled. The generally poor correlation on a monthly basis probably stemmed from the small monthly ranges of temperature and salinity. A re-examination of the data for all months of the year was begun.

The manuscript "The first record of black skipjack (Katsuwonus [illegible]) from the Hawaiian Islands" was revised and submitted to Copeia. The manuscript was accepted for publication.

Upon the request by the FAO Expert Panel for the Facilitation of Tuna Research, a mutually standard surface tow was established for vessels not equipped for double oblique tows. The details of the procedure were described. Additional information on the equipment required for double oblique tows was also presented. Responses to certain portions of the Working Group report were drawn and the data were submitted to the new Chairman of the FAO Expert Panel for the Facilitation of Tuna Research.

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File No.

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Albacore Ecology

Period Covered: January, February, March 1967 (FY-67)

APR 28 196

Program Leader: Tunio Otsu Date

Reviewed by:

Chief, Field Station or Office of Origin _____ Date

Acting
Regional or Area Director R. S. Shomura Date

Branch Chief J. E. King Date

STATEMENT OF PROGRAM ACCOMPLISHMENT

During the quarter, between December 18, 1966 and March 31, 1967, our field station personnel in American Samoa sampled the size and sex of 9,272 albacore from 180 trip landings. Through the cooperation of vessel operators, catch and effort data representing 175 of these trips were obtained, thus giving us a 74 percent data coverage for the period.

The Program Chief spent the period January 3-11 in American Samoa, where he inspected our field station facilities, and consulted with officials of the Department of American Samoa and the tuna canneries. He also met several of the fishing company representatives in Samoa. In general he found that the sampling station is functioning very effectively, with the cooperation of the officials of the Government of American Samoa and of the various segments of the industry.

1. The manuscript on the early life history of albacore by M. O. Yoshida was sent to Dr. Glenn Flittner of Tuna Resources Laboratory and to Mr. Robert Wolf of the California Department of Fish and Game for review.

2. The manuscript, "Distribution, apparent abundance, and size composition of albacore taken in the Samoa-based longline fishery, 1954-63" by T. Otsu and R. E. Sumida was reviewed by Dr. Henry Regier, Stanford University, Mr. Purnia Upadhyay, [illegible] University and Mr. Robert Retzler of Star-Kist Company.

3. A manuscript entitled "Faiga Faiva o Samoa: Fisheries of Samoa" by T. Otsu and H. O. Yoshida was submitted to Mr. Sidney Shapiro, editor of "Our Changing Fisheries" volume of the Bureau's Resources Series.

[illegible]

Mr. Isao Ito, Fishery Specialist for the U. S. Civil Administration of the Ryukyu Islands, continued his training at the Laboratory. During the quarter he worked with several staff members on Hawaiian skipjack stocks, prepared blood smears and electrophoretic techniques used in subpopulation studies and initiated preliminary work on skipjack tuna. He also spent some time with technicians of the State of Hawaii Division of Fish and Game. Mr. Ito's training program included some aerial photographic coverage by the U. S. Army for a migratory survey in Okinawa. His program in Hawaii terminates on April 17 at which time he will proceed to California to spend two weeks with scientists of [illegible] Region 4.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Albacore Ecology

Project Title: Investigate ecology of albacore (131.45R)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Howard O. Yoshida Date: APR 28

STATEMENT OF PROJECT ACCOMPLISHMENT

[illegible] billfish stomachs for juvenile tunas continued. Stomachs of [illegible] billfishes captured by Samoa-based longline vessels were examined during the quarter. The billfishes, including 65 black marlin, 39 sailfish, 22 shortbill [illegible], 20 blue marlin, 44 broadbill swordfish, 15 striped marlin, and [illegible] billfishes, were captured between October 1966 and January 1967 in an area bounded by lat. 10° - 13° S., and long. 127° W. - 177° E. Tunas [illegible] albacore, 96 skipjack and 19 unidentified tuna juveniles [illegible]. The albacore were 5.7 - 26.0 cm. long and the skipjack 7.0 - 57.2 cm. long.

The data collected through July 1966 from the Samoan longline fishery indicate that juvenile albacore and skipjack are very widely distributed in the South Pacific. Juveniles of both species were found in stomachs of billfishes captured between lat. 5° and 31° S. Within these latitudes juvenile albacore were found between long. 115° W. and the 180th meridian, and juvenile skipjack between long. 171° W. and 174° E.

In connection with the reorganization of the Laboratory, the stomach sampling program in American Samoa is being phased out. The sampler in American Samoa was instructed to remove the stainless steel collecting tanks from the evaporating [illegible].

The manuscript on the early life history of albacore by H. O. Yoshida was sent to [illegible] Fiedler of the Tuna Resources Laboratory and to Mr. Robert Dell of the California Department of Fish and Game for "outside review."

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Albacore Ecology

Project Title: Investigate population dynamics of albacore (131.451)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Tamio Otsu Date

STATEMENT OF PROJECT ACCOMPLISHMENT

The longline fishery based in American Samoa continues to be closely monitored through a field station which was established by the Laboratory in April 1963. The over-all catch rate of albacore, the principal species taken by the fishery, continues at a relatively high level, between 4 and 6 albacore per 100 hooks. The size of the albacore taken has fluctuated considerably but there is no discernible trend in size. The longliners have tended to move farther away from the base in Samoa in search of better fishing and the fishing effort has continued to increase by the addition of more, and larger, vessels. It is important that a close watch be kept on developments with respect to the effect of the fishery on the resource.

During the quarter, between December 18, 1966 and March 31, 1967, our field station personnel in Samoa sampled 9,270 albacore for size and sex from 195 trip landings. Catch and effort data covering 175 of these trips were obtained through the cooperation of the Korean, Japanese, and Chinese vessel operators.

The manuscript, "Distribution, apparent abundance, and size composition of albacore taken in the Samoa-based longline fishery, 1954-65" by T. Otsu and R. F. Sumida, was revised after reviewers' comments. It is intended for publication as a fishery bulletin.

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File No.

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Subpopulations

Period Covered: January, February, March 1967 (FY 1967)

Program Leader: Kazuo Fujino Date: APR 28 1967

Reviewed by:

Chief, Field Station or Office of Origin: _____ Date: _____

Acting Regional Director/Area Director: R. S. Shomura Date: _____

Branch Chief: J. E. King Date: _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Analyses were made on the blood specimens of 957 skipjack tuna taken from waters of the equatorial Atlantic, southeastern Pacific, Hawaii, Christmas Island, and Palau.

Results of the analysis of serum esterase system of skipjack tuna for the above specimens supported the results of the system reported for the last quarter and provided additional information on a skipjack population in the southeastern Pacific.

Serum transferrin data accumulated since 1965 for skipjack, southern bluefin, and other species of tunas were summarized, and analyzed, and will be presented in a manuscript.

Reagents of the R blood group system of the skipjack tuna, which is amenable to the Hardy-Weinberg principle, were reproduced and applied in subpopulation studies.

Subpopulations Program - continued

One thousand two hundred and seventeen blood and serum specimens of skipjack, bigeye and other species of tunas were received from the Tropical Atlantic Biological Laboratory, IATTC, Palau, CHARLES H. CLEMENT (Cruise 9), [illegible] of the Fisheries Agency of Japan, and NIHONDAIGAKUKO of the University of Tokyo.

One thousand one hundred and twenty-eight frozen blood, serum, and tissue specimens of bigeye, yellowfin, skipjack and other species of tunas and tunalike were shipped to Dr. Sprague in Sweden.

Dr. Fujino attended the midwinter conference of immunologists which was held in Honolulu. He also completed an informal evening course in supervision at the University of Hawaii.

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File No.

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Subpopulations

Project Title: Investigate tuna subpopulations through the use of blood groups and inherited proteins (131.47D)

Period Covered: January, February, March 1967 (F.Y. 1967)

Project Leader: Kazuo Fujino Date: APR 2 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Nine hundred and fifty-seven blood specimens of skipjack tuna taken from waters of the equatorial Atlantic, southeastern Pacific, Hawaii, Christmas Island, and Palau were analyzed for established blood group systems and serum protein polymorphisms.

Results of the analysis of serum esterase system of skipjack tuna for these specimens supported the earlier results reported last quarter and suggested that there is a marked differential gene frequencies of the esterase system between populations in the north and south Pacific Oceans.

Serum transferrin data of skipjack tuna accumulated since 1965 were summarized and analyzed. The results showed that no significant heterogeneity exists in gene frequencies of the system within and between areas of the Atlantic, Hawaii, Palau, and Japan.

The R blood group system has been applied for subpopulation study to evaluate the merit of the system as genetic trait.

Thus, the genetic systems established in skipjack tuna are the blood group system E, Y, R, and serum protein systems in esterase and transferrin components, which are amenable to Hardy-Weinberg principle, except E-blood group system.

Manuscripts

Reviewed by outside reviewers and being edited by Laboratory's Editor:

K. Fujino and T. Kang. Serum esterase groups of Pacific and Atlantic tunas.

Subpopulations Program (131.47D) - continued

Manuscript revised:

H. Fujino, L. M. Sprague, and T. K. Kazama. The Y system of skipjack tuna blood groups.

In preparation:

H. Fujino and T. K. Kazama. New factors of the Y blood group system.
H. Fujino and T. Kang. Transferrin groups of Pacific and Atlantic tunas.

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File No.

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Regional Area: Hawaii

Program Title: Subpopulations

Project Title: Provide for activities of Tuna Blood Group Center (131.47E)

Period Covered: January, February, March 1967 (F.Y. 67)

Project Leader: Kazuo Fujino Date: APR 28 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

We received frozen blood specimens of 100 skipjack (3rd shipment) from BCF's Tropical Atlantic Biological Laboratory, Miami; 555 skipjack (2nd through 5th shipments) from our sampling station in Palau; 33 skipjack and other tunas from [illegible] (Cruise 9); 64 various species of tunas from SHOYO MARU, and 76 skipjack and 114 bigeye from NIHONDAIGAKUGO and serum specimens of 209 yellowfin and 50 bluefin from IATTC.

In response to Dr. Sprague's request, we shipped 1,128 frozen blood, serum, and tissue specimens of bigeye, yellowfin, skipjack and other species of tunas and marlins to Sweden for his electrophoretic study.

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File No.

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Area: Hawaii

Program Title: Subpopulations

Project Title: Investigate the genetics of fishes (131.47F)

Period Covered: January, February, March 1967 (F.Y. 67)

Project Leader: Kazuo Fujino Date: APR 18 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Data on transferrin polymorphism of skipjack tuna, accumulated since 1965, were summarized with a primary objective to find reasons of bias from the condition of Hardy-Weinberg genetic equilibrium recognized earlier. The results are as follows:

1. Five individual differences were observed as the combinations of three bands--fast, medium, and slow. The fast band occurred only as a heterozygote with the combinations of the other two bands in low incidences.

2. Hardy-Weinberg analysis showed that these individual differences are determined by three alleles.

3. The system is genetically independent of any known genetic systems, i.e., blood groups B and Y and serum esterase, and sex.

4. Excessive incidences of occurrence of a heterozygote, consisting of medium and slow bands, were observed in the samples taken from waters of Hawaii, Palau, and Japan, but not the Atlantic.

5. Association of relative phenotypic incidences, but not gene frequencies, to the size groups was also recognized.

6. Using data taken from Hawaiian waters, it was recognized that the degree of excessive incidence of a heterozygote and of shortage of two homozygotes increases with the increment of size of fish and disappears at approximately 86-88 cm. fork-length.

Polymorphisms Program (131.47F) - continued

7. Relative fitness of each phenotype was calculated from ratios of observed/expected incidences of phenotypes.

8. On the basis of the above observation, a model was proposed on the mechanism of maintaining polymorphism of transferrin system within a random mating population.

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QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Indian Ocean

Period Covered: January, February, March, 1967 (FY-67)

Program Leader: Richard S. Shomura Date APR 28 1967

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

Regional or Area Director R. S. Shomura Date [illegible]

Branch Chief J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Research

In January, Mr. Shomura attended a meeting in Rome of the Working Party on the Rational Utilization of the Indian Ocean Resources. At the meeting, a committee headed by Mr. Shomura and consisting of Drs. D. Menasveta, F. Talbot and A. Suda prepared a draft of a working paper entitled "The Present Status of Fisheries and Investment of Potential Resources of the Indian Ocean and Adjacent Seas." Mr. Shomura devoted some time editing and revising the preliminary draft. The final document was typed and forwarded to Rome in time to be available for the meeting of the FAO Committee on Fisheries (COFI) in April.

Mr. Jones continued with the study of predicting skipjack catch in the Hawaiian fishery by the correlation between the variations in skipjack catch and the temperature distribution in the area northeast of the islands.

Mr. Snell is revising and expanding his draft describing the result of his study of the distribution of the surface water masses of the Indian Ocean.

Accepted for publication: Strasburg, D. W., E. C. Jones and R. T. B. Iverson. [illegible] of a small submarine for biological and oceanographical research. Jour. du Conseil.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Indian Ocean

Project Title: Study the ecology of apex predators in the Indian Ocean (131.94B)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Richard S. Shomura Date: APR 28 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Mr. Osell completed the first draft of his manuscript describing the origin of one of the high salinity water masses in the Arabian Sea. The result of his study showed evidence that strongly suggests that the high salinity subsurface water from the Persian Gulf contributes more high salinity water to the Arabian Sea than was previously suspected. Mr. Osell is presently revising and expanding the draft.

Form 2-119a(Sept.1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No.

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Indian Ocean

Project Title: Study zooplankton organisms as biological indicators of differe water masses and water types in the Indian Ocean (131.94E)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: E. C. Jones Date APR 2 8 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Research:

Further study of the relationship between the variations in skipjack catch in the Hawaiian fishery and the temperature distribution in the area northeast of the Islands has led to several correlations which may prove to be useful as predictive tools. The amount of latitudian shift of the 20°C surface isotherm between summer and the following winter is correlated with the catch of skipjack of the following year. These year to year variations in the amount of shift of the surface isotherms appear to be related to changes in velocity of the rotation of parts of the large North Pacific gyre system. These variations in velocity appear to be traceable back in time and space to the Kuroshio off Japan. A strong negative correlation was found between mean velocities of the Kuroshio and the total skipjack catch in Hawaii three years later. Their value was 0.902 with 6 degrees of freedom.

Evidence was found that in years when the catch in Hawaii is low, the peak of skipjack catches by Japanese long-line vessels is further south than when the catch in Hawaii is high. This supports a conclusion drawn from other evidence that during poor fishing years in Hawaii, most of the skipjack are carried south of the fishing area.

Manuscripts:

Accepted for publication: Strasburg, D. W., E. C. Jones and R. T. B. Iversen. Use of a small submarine for biological and oceanographic research. By Journ. du Conseil.

Form 2-119a(Sept.1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Indian Ocean

Project Title: ~~Study feeding habits of the apex predators in the middle~~ western Indian Ocean (131.94F)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Richard S. Shomura Date APR 28 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity.

Form 2-119a(Sept.1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Indian Ocean

Project Title: Investigate the identification and distribution of tuna larvae and juveniles in the Indian Ocean (131.94G)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Walter M. Matsumoto Date APR 28 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity.

Form 2-119 (Sept.1960) UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Trade Wind Zone Oceanography

Period Covered: January, February, March 1967 (FY-67)

Program Leader: Gunter R. Seckel / Date APR 28 1967

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

Acting Area Director R. S. Shomura Date APR 28

Branch Chief J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

During the quarter processing of pilot study data for descriptive and analytical reports and processing of meteorological data was continued.

The change per month in thickness (divergence) of selected layers was computed and charts were prepared. Computation of dynamic height anomalies for significant layers was begun.

The oceanographic climate in Hawaiian waters as reflected by Koko Head temperatures and salinities showed marked departure from that normally experienced during the first three months of the year since 1956. Mean temperatures declined at a rate of 0.71° C per month from February to March. Normally the temperature change during this time is small.

orm 2-119a(Sept.1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Trade Wind Zone Oceanography

Project Title: Study association between trade wind system and North Pacific oceanographic climate (include full-scale field program) (131.1

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Gunter R. Seckel Date APR 28

STATEMENT OF PROJECT ACCOMPLISHMENT

Meteorological and oceanographic data are being processed in preparation for reports dealing with the trade wind system and the oceanographic climate.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Trade Wind Zone Oceanography

Project Title: Investigate seasonal variations, surface water types, Hawaiian area (Koko Head) (131.9SD)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Gunter R. Seckel Date APR 28 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

During the first quarter of 1967 the Koko Head heating curve showed a pattern which differed significantly from those of previous years. Initial warming of the surface waters occurs normally (based on Koko Head monitoring data since 1956) during February or March. Subsequent cooling occasionally takes place but is brief and minor in magnitude. In 1967 initial warming took place in January but lasted only a short time. Subsequently, the temperature declined again. The rate of decline of mean temperatures from February to March reached 0.7° C per month. The only other year when initial warming took place in January was 1961. In contrast to 1967, during 1961 the initial warming period lasted two months and reached a rate of 0.8° C per month followed by only a slight and brief period of cooling between March and April.

Salinities were also different during the two years. In 1961 the long-term salinity cycle was at the low portion of its range whereas during the winter of 1967 it was at the upper portion of its range. On the basis of the Koko Head data, therefore, the oceanographic climate in Hawaii during the first quarter of 1967 departed significantly from the conditions previously measured.

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UNITED STATES DEPARTMENT OF THE INTERIOR
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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Trade Wind Zone Oceanography

Project Title: Conduct pilot study of limited portion of TWZO area (data and descriptive reports) (131.99F)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Gunter R. Seckel Date APR 28 196

STATEMENT OF PROJECT ACCOMPLISHMENT

During the quarter processing of pilot study data for descriptive and analytical reports and processing of meteorological data was continued.

Using significant surfaces, namely the salinity maximum surface and the salinity minimum surface, salt and volume budgets for the layers so bounded have been computed. Charts showing the change of thickness per month for these layers have been prepared. These will be used when the diverging or converging effects of the trade wind system are to be considered (project 131.99C).

The change of thickness of layers (divergence) affects the geostrophic flow. Computation of the dynamic height anomalies for the significant layers is in progress. These computations will enable demonstration of the effects of convergence and divergence of water in the main layers on the geostrophic flow.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Trade Wind Zone Oceanography

Project Title: Analyze and publish basic data from pilot study (Analytic studies) (131.99G)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Gunter R. Seckel Date APR 24 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Results of Pilot Study are being processed in preparation for analytical studies.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Research Submarine Program

Period Covered: January, February, March 1967 (FY-67)

Program Leader: Donald W. Strasburg Date: APR 28 1967

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

Regional or Area Director: R. S. Shomura Date: APR 28 1967

Branch Chief: J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Dr. Strasburg resigned on March 17, 1967 and accepted a position with the Electric Boat Company in Groton, Connecticut. He spent most of the months of January and February making preparations to leave.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Research Submarine

Project Title: Explore research applications as basis for design (131.110A)

Period Covered: January, February, March 1967 (FY-67)

Project Leader: Donald W. Strasburg Date: APR 28 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin Biological Laboratory, Honolulu

Region or Area Hawaii

Program Title Research Submarine

Project Title Monitor construction (131.110B)

Period Covered January, February, March 1967 (FY-67)

Project Leader Donald W. Strasburg Date

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity.

Form 2-119 (Sept.1960) UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND [illegible] SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Period Covered _____

Program Leader _____ Date

Reviewed by:

Chief, Field Station
or Office of Origin _____ Date

Regional or Area Director _____ Date

Branch Chief _____ Date

STATEMENT OF PROGRAM ACCOMPLISHMENT

Form 2-119a(Sept.1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

With the delivery of the manuscript [illegible] to the University [illegible] and completed.

Form 2-119a (Sept. 1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No. _____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

Form I-119a(5-[illegible],1960)

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

orm 2-119a(Sept.1960)

File No. _____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

Form 1-111a(Sept.1966)

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____

STATEMENT OF PROJECT ACCOMPLISHMENT

Form S-119a(Sept.1936)

File No._____

QUARTERLY PROJECT ACCOMPLISHMENT REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date

STATEMENT OF PROJECT ACCOMPLISHMENT

Form 2-419 (Sept.1960) UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Period Covered _____

Program Leader _____ Date _____

Reviewed by:

Chief, Field Station
or Office of Origin _____ Date _____

Regional or Area Director _____ Date _____

Branch Chief J. H. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Form 2-119a(Sept.1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: [illegible]

Project Title: [illegible]

Period Covered: [illegible]

Project Leader: Robert T. B. Iversen Date: [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

[illegible]

Form 2-1158(Sept.1968)

BUREAU OF COMMERCIAL FISHERIES

File No. _____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

UNITED STATES [illegible] OF THE INTERIOR
[illegible] SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No. _____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

Form 2-1113(May, 1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE

File No._____

QUARTERLY FISH-CULTURAL PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

BUREAU [illegible]

[illegible]

QUARTERLY PROJECT [illegible] REPORT

Main Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

[illegible]

Form 2-119a(Sept.1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No. _____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

Form 9-119a(Sept 1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

Form 2-119a(Sept.1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Investigate physiology of the tunas (131.43P)

Period Covered: April, May, June, 1967 (FY-67)

Project Leader: John J. Magnuson Date

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity

orm 2-119a(Sept.1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Determine alternate live-bait species

Period Covered: April, May, June, 1967 (FY-67)

Project Leader: Eugene L. Nakamura Date: JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

The behavior of chummed nehu and chummed mosquitofish were observed [illegible] from a sea sled during CHS-100 in April. The sea sled descended to [illegible] feet. Both nehu and mosquitofish were seen at this depth. On the same cruise, a diver with a depth gauge followed mosquitofish down. The fish were seen down to 60 feet in 1 minute and to 100 feet in 2 minutes.

Eight aquaria were set up at Kewalo to hold baitfish. They are called baitfish aquaria, because they are pallet-mounted wooden storage bins lined with polyethylene sheets. The plumbing has been arranged for both salt and fresh water. These aquaria are proving to be very practical.

Shipments of silver carp (Hypophthalmichthys molitrix) from Taiwan, bighead (Aristichthys nobilis) from Thailand, and golden shiner (Notemigonus crysoleucas auratus) from the mainland U.S. were received in June. [illegible] of the silver carp were dead on arrival. About 200 were still alive, but many of these were moribund. By the end of June, only seven remained. The other fishes arrived in excellent condition. Shiners from the first shipment suffered heavy mortalities from fungal infections about 1 week after arrival. Shiners from the second shipment were dipped for about 10 minutes in a weak solution of sodium hypochlorite (3 ounces of Chlorox in a gallon of water) as a prophylaxis and are in excellent condition.

The behavior of nehu and tilapia chummed into a tank under various experimental conditions was filmed. Without predators, nehu swam [illegible] the bottom in a leisurely fashion with a diving angle of not [illegible] about 20 degrees, usually only 5 to 10 degrees. With two E[illegible] on presence, the nehu [illegible] along the surface. They did not swim down to [illegible] about three times faster than normal [illegible] When nehu were squeezed, their swimming [illegible] dive to the bottom in a corkscrew manner. [illegible] usually the last to be eaten. When [illegible] E. affinis kept pursuing the bait for a longer per[illegible] not on. Also, the nehu appeared to escape more often. The [illegible] by the [illegible] appeared to be 2 or 3 times longer than without [illegible] E. [illegible] tilapia chummed into the tank with predators a[illegible] they [illegible] rapidly and usually straight down. The tuna spent [illegible] their predation time chasing tilapia near the bottom. With nehu the [illegible] spent most of their time at the surface.

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FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Tuna Ecology

Period Covered: April, May, June, 1967 (FY-67)

Acting Program Leader: Tamio Otsu Date JUL 27 1967

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

Acting ~~Regional Director~~ Area Director B. J. Rothschild Date _____

Branch Chief J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Tamio Otsu was assigned to serve as Acting Chief, Tuna Ecology Program while Brian Rothschild was designated Acting Deputy Area Director.

The Albacore Ecology Program and the Skipjack-Yellowfin Ecology Program were combined into the Tuna Ecology Program under the Laboratory's recent reorganization.

The Hawaiian skipjack catch for the second quarter of 1967 was estimated to be 1,121,000 pounds below the 1948-66 average for the same period.

A summer skipjack scouting and fishing observational program was launched during the quarter with the assignment of observers aboard seven Hawaiian aku boats.

A skipjack tuna bearing the tag of the Inter-American Tropical Tuna Commission was recaptured in Hawaiian waters, marking the third confirmed recovery in Hawaii of a skipjack tagged in the eastern Pacific.

The field stations in American Samoa and Palau continued to function effectively.

The landings of the Samoa-based longline fishery continued to increase greatly. The monthly albacore catch rates as well as albacore size, though fluctuating, do not show any [illegible]. Fishing effort has continued to increase.

Skipjack fishing in Palau was generally poor during the quarter.

A skipjack-yellowfin tagging program was instituted in Palau during June in cooperation with the Government of the Trust Territory.

Significant progress was made in the "trawl project" with the completion of successful midwater trawling tests on the [illegible] CROMWELL. [illegible] of apparent juvenile skipjack and fish-schooling cycle in the Equatorial area, especially encouraging. Extensive trawling will begin in July.

"Competition for gear in a multiple-species fishery" by Brian J. Rothschild was published in Journal du Conseil 31(1):102-110.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin	Biological Laboratory, Honolulu
Region or Area	Hawaii
Program Title	Tuna Ecology
Project Title	Investigate ecology of skipjack and yellowfin (131.44A)
Period Covered	April, May, June, 1967 (FY-67)
Project Leader	Brian J. Rothschild Date JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Significant progress was made during the quarter in the "trawl project" with the completion of successful tests on TOWNSEND CROMWELL Cruise 31. Underwater observations and photographs by divers on the sea sled revealed that the net performed beautifully. Seven trawl stations were occupied, all off leeward Oahu on the Makaha side of Kaena Point. Six stations were during the day; one at night. All stations were in water of about 400-700 fathoms about 5 miles offshore. Six post-larval and juvenile skipjack (fork length 9-46 mm.) were taken in three of the daytime hauls near the surface. In the same haul with the 46-mm. skipjack were 327 juvenile opelu (Decapterus pinnulatus) caught at a depth of about 15 meters. The capture of the skipjack and the fast-swimming opelu juveniles in these few trial tows is highly encouraging.

On TOWNSEND CROMWELL Cruise 31, the scientific field party dipnetted under a night light 48 juvenile scombrids on two successive nights (May 27 and 28) off leeward Oahu. Thirty-eight of the juveniles were Auxis, and the remaining 10 were Euthynnus. Several of the juveniles were returned alive to Honolulu. One juvenile (Euthynnus, 37 mm. at death) lived for one week in captivity, and was observed to consume 6 small guppies at one feeding at noon on May 29 and May 30. This fish was also observed to attack two smaller juvenile Euthynnus but not to molest the Auxis. Unfortunately, none of the juveniles lived long enough for careful observations to be made on their feeding behavior and growth pattern.

The [illegible] cruise ([illegible] Cruise 12) is scheduled to begin on July 12. Plans call for three 6-hour trawl runs per day to be made near the surface and at depths near the salinity minimum in both inshore and offshore waters off Leeward Oahu. In addition to the intensive use of the mid-water trawl, attempts will be made to capture juvenile fishes by means of a lift net after attracting the fish under a night light, and also by the use of a miniature longline designed by Dr. Hiroshi [illegible], a visiting investigator from Japan.

A skipjack-yellowfin tagging program was initiated in Palau during June, when Biologist Richard Uchida spent twelve days on the Trust Territory vessel, [illegible], and tagged 45 skipjack tuna. Mr. Jack Tomiyasu, Peace Corps volunteer with the Palau Fisheries Development Station, was instructed in tagging and data-recording procedures so that he may either carry on this work in Palau or be able to instruct others in this work.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Tuna Ecology

Project Title: Investigate population dynamics of skipjack in Hawaiian waters (191.442)

Period Covered: April, May, June, 1967 (FY-67)

Project Leader: Brian J. Rothschild Date JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Analysis of oceanographic data collected in 1955-58 during the Oahu Comprehensive and Monitoring Survey cruises continued during the quarter. A multiple regression analysis used to evaluate the mutual relationship between average surface salinity, average surface temperature, average depth of mixed layer, and catch per standard effective trip indicated that there was a significant negative correlation between catch per standard effective trip and average surface salinity in the southern sector of Oahu. Analysis of the remaining sectors is being continued.

The first draft of the manuscript describing the distribution of fishing effort and the resulting skipjack tuna catches in Hawaiian waters by quarters of the year for 1948-65 was revised.

A summer skipjack fishery scouting and fishing observational program was launched during the quarter. Seven technicians were hired and placed aboard seven commercial skipjack boats to observe fishing and scouting operations. Among the data being collected are catch per school, the number of schools fished per trip, the number of fish caught from each school fished, average size of the fish in each school, number of schools sighted but not fished, and surface temperature. Surface water samples are also being collected for salinity determinations.

A skipjack tuna bearing the tag of the Inter-American Tropical Tuna Commission in San Diego was recaptured by the Honolulu sport fishing [illegible] about 10 miles south of Barber's Point, Oahu. The fish, weighing 27-3/4 pounds, was one of 74 fish taken from a school fished on June 27. This recovery is the third in Hawaiian waters of a skipjack tagged in the eastern Pacific in recent years (a fourth unconfirmed recapture was reported last year).

The total skipjack landings in the Hawaiian fishery during the quarter were estimated at 2,240,000 pounds, which is 1,121,000 pounds below the [illegible] average for the same period. The January-June landings were estimated at 2,953,000 pounds, which is 1,1[illegible],000 pounds below the long-term average for the period. Sixty-six per cent of the catch were large fish (averaging 25 pounds) while 19 per cent were small fish averaging 4 pounds. The "season fish" (18-20 pounds) are notably lacking in the landings made thus far this season.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Tuna Ecology

Project Title: Investigate systematics and ecology of tuna larvae and juveniles (131.44D)

Period Covered: April, May, June, 1967 (FY-67)

Project Leader: Walter M. Matsumoto Date JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Calculations for correlations between skipjack larvae and temperature in equatorial waters and between skipjack larvae and salinity in equatorial as well as Hawaiian waters were completed. Similar calculations were made for yellowfin tuna larvae. Highly significant correlations ($p<0.01$) were found between skipjack and temperature in both Hawaiian and equatorial waters, and between skipjack and salinity in equatorial waters. The correlation between skipjack and salinity in Hawaiian waters was non-significant ($p>0.50$).

The results for yellowfin tuna were varied. Highly significant ($p<0.01$) correlations were found between yellowfin and temperature in Hawaiian waters and between yellowfin and salinity in equatorial waters. Correlations between yellowfin and temperature in equatorial waters and between yellowfin and salinity in Hawaiian waters were non-significant ($p>0.10$).

The first draft of a manuscript, "Distribution and abundance of larval skipjack and yellowfin tuna in the central Pacific Ocean east of the 180th meridian" was started. The page proof of the manuscript, "The first record of black skipjack (Euthynnus lineatus Kishinouye) from the Hawaiian Islands" was reviewed.

Specifications and preliminary drawings for the construction of the FAO standard net for collecting tuna larvae were completed. Net construction is scheduled for the next fiscal year.

The Project Leader was on extended (5 weeks) sick leave during the quarter.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Tuna Ecology

Project Title: Investigate dynamics of marine fishes (131.44E)

Period Covered: April, May, June, 1967 (FY-67)

Project Leader: Brian J. Rothschild Date JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

The fishery for skipjack tuna in Palau was still feeling the after effects of Typhoon Sally which virtually brought the tuna fishing industry to a halt during the first quarter. Only two Okinawan vessels resumed fishing during the early part of this quarter; others rejoined the fleet as repairs to the vessels were effected. Progress toward normal operations was further impeded by a 2-month long strike among V.n Camp's workers. The Trust Territory's aku fishing vessel EMBARGO, also badly damaged in the typhoon, started fishing toward the end of the quarter.

Field station personnel in Palau measured 2,503 skipjack tuna and 9 yellowfin tuna during the quarter. From among the 9 quarts of bait samples collected for Laboratory study, they measured 1,323 Palauan nehu (Stolephorus heterolobus). They also obtained data on weight and sex from 357 skipjack and collected 46 ovaries and 418 blood samples.

The field station personnel in American Samoa obtained four specimens of Gasterochisma melampus taken by Japanese and Korean longline vessels in the area 33°-35° S., 139°-143° W. These specimens, as well as several dogtooth tuna (Gymnosarda unicolor), taken in Samoan waters, will be shipped to the U. S. National Museum for study by the FAO Working Party on Tuna Taxonomy.

"Competition for gear in a multiple-species fishery" by Brian J. Rothschild was published in Journal du Conseil, 31(1):102-110.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Tuna Ecology

Project Title: Investigate population dynamics of albacore (131.45I)

Period Covered: April, May, June, 1967 (FY-67)

Project Leader: Tamio Otsu Date: JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

During the quarter our field station personnel in American Samoa sampled the length, weight and sex of 8,930 albacore from 180 trip landings. Catch and effort data from 166 of the fishing trips were obtained through vessel operators. The average catch rate during the period was 4.3 albacore per 100 hooks; the fish averaged 91.5 cm. in length.

The landings of the Samoa-based longline fishery continued to increase greatly. The 1966 total albacore landings amounted to 25,300 metric tons, an increase of 65 per cent over the 1965 landings. There were also large increases in the landings of yellowfin and bigeye tunas. In 1966, the canneries purchased 6,530 metric tons of yellowfin tuna and 4,521 metric tons of bigeye tuna (increases of 69 and 74 per cent, respectively, over 1965). The monthly albacore catch rates continued to average in the 4.0-5.5 range. Though fluctuating greatly, there is no downward trend in albacore sizes. Fishing effort (number of vessels) have continued to increase. As of April 1967, there were 74 vessels from Taiwan, 56 from Korea, and 35 from Japan fishing out of American Samoa.

Work continued on the North Pacific albacore longline data. Sections of the manuscript on temporal changes in apparent abundance were completed. Annual and longer term periodicities for spatial moments and standard deviations were studied. Moment statistics enabled calculation of apparent movement of albacore through the longline grounds. The longitudinal vector of apparent movement indicated an average speed of 7 miles per day. This study is continuing.

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File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Subpopulations

Period Covered: April, May, June, 1967 (FY-67)

Program Leader: Kazuo Fujino Date JUL 27 1967

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

Acting ~~Regional or~~ Area Director B. J. Rothschild Date _____

Branch Chief J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Analyses were made on the blood specimens of 973 skipjack tuna taken from waters of Palau and Hawaii.

Data on the B blood group system of 3,552 skipjack tuna collected since 1965 from various geographical areas were statically analyzed to check our earlier results on the association of some blood factors of the system to size groups of fish.

Identification of transferrin bands of various species of tunas was successfully made by labeling with radioisotope Fe^{59} sulfate, followed by preparation of autograph.

Data on serum polymorphisms of skipjack tuna collected from Palau were updated.

Data on the serum esterase and transferrin systems, genetically independent of each other, of 705 yellowfin tuna collected from waters of the eastern Pacific, Hawaii, and Christmas Island since 1964 have been statistically compared.

Direct comparison in the identification of transferrin bands of skipjack and yellowfin tuna was made between Inter-American Tropical Tuna Commission, La Jolla and our Laboratory.

In response to the request by Mr. I. Barrett, IATTC, 309 yellowfin serum collected from waters of Hawaii and Christmas Island were sent to Him.

Arrangement has been made to establish a cooperative skipjack tuna blood sample collection from Japanese waters by Mr. Yukio Kondowara of the Nankai Regional Fisheries Research Laboratory, Japan.

Messrs. Kang, Kazama, Hashimoto, and Watarai completed a variety of training courses in administration and sciences given at the University of Hawaii.

Miss Yvonne Sur, NSF summer apprentice, joined the Program to conduct some electrophoretic study of tuna serum.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Subpopulations

Project Title: Investigate tuna subpopulations through the use of blood groups and inherited proteins (131.47D)

Period Covered: April, May, June, 1967 (FY-67)

Project Leader: Kazuo Fujino Date JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Nine hundred and seventy-three blood specimens of skipjack tuna taken from waters of Palau and Hawaii were analyzed for the established blood group and serum group systems.

Data on the serum esterase groups of skipjack tuna were updated. The results supported our earlier observation of the differential gene frequencies of the system between Hawaii and Palau (in heterogeneity test highly significant $0.001>P$).

Identification of transferrin bands of various species of tunas was successfully made by labeling with radioisotope Fe^{59} sulfate, followed by preparation of autograp... The results were consistent with those obtained in our initial staining technique with amido-black.

Data on the B blood group system of 3,552 skipjack tuna collected since 1965 from the waters of the Atlantic, Hawaii, and Palau, have been summarized. The results supported our earlier observation that the incidence of B-positive group varies with the increment of size of fish and indicated that the B blood group factors are still useful in subpopulation study with a concurrent size measurement of fish.

Data on the serum esterase and transferrin systems, genetically independent of each other, of 705 yellowfin tuna collected from waters of the eastern Pacific, Hawaii, and Christmas Island since 1964 have been statistically compared. No significant heterogeneity was observed in gene frequencies within and among these three areas.

Manuscripts

Submitted to the editor of Copeia:

K. Fujino and T. Kang, Serum esterase groups of Pacific and Atlantic tunas.

Submitted to Laboratory's editor:

K. Fujino and T. Kang, Transferrin groups of tunas.

Being revised for forwarding to Dr. Sprague (co-author)

K. Fujino, L. M. Sprague, and T. K. Kazama, The Y system of skipjack tuna blood groups.

In preparation:

K. Fujino, Skipjack tuna subpopulations survey.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Subpopulations

Project Title: Provide for activities of Tuna Blood Group Center (131.47E)

Period Covered: April, May, June, 1967 (FY-67)

Project Leader: Kazuo Fujino Date JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Direct comparison of identification of transferrin bands of skipjack and yellowfin tunas was made by exchanging serum and supernatant specimens between our Laboratory and the Laboratory of the Inter-American Tropical Tuna Commission, La Jolla. The results indicated that our bands 2 and 3 of yellowfin correspond to their bands A and B and our bands, 1, 2, and 3 of skipjack to their C, D, and E. This made possible comparison of population data collected by both laboratories independently. Our band 1 of yellowfin has not been observed by the staff of the IATTC yet.

In response to the request of Mr. I. Barrett, IATTC, 309 yellowfin serum collected from waters of Hawaiian and Christmas Islands were sent to him.

The arrangement has been set up to establish a cooperative collection of skipjack tuna blood samples from Japanese waters by Mr. Tadao Kamimura of the Nankai Regional Fisheries Research Laboratory, Japan.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Subpopulations

Project Title: Investigate the genetics of fishes (131.47F)

Period Covered: April, May, June, 1967 (FY-67)

Project Leader: Kazuo Fujino Date JUL 7 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Data on transferrin groups of skipjack tuna collected from Palau were updated. The results supported our earlier observation on the excessive occurrence of heterozygote and deficiency of homozygotes of phenotypic incidences of transferrin system and their association to size of fish which were initially observed in the Hawaiian samples. The results were put into the manuscript with the data from other areas.

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QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Fishery Development

Period Covered: April, May, June, 1967 (FY-67)

Program Leader: Richard S. Shomura Date: JUL 27 1967

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

Acting ~~Regional or~~ Area Director: B. J. Rothschild Date _____

Branch Chief: J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

The Fishery Development Program was formally organized in early April. The staff presently consists of R. Shomura (Program Chief), T. Hida, E. Jones, H. Yoshida, F. Osell, H. Johnsen and E. Onizuka.

The general area of research projected for the program includes (1) develop methods to increase the efficiency of the Hawaiian skipjack fishery, (2) develop methods to increase the efficiency of the Hawaiian longline fishery, (3) develop a high-seas tuna fishery, (4) develop fisheries for other resources, and (5) explore fishery and research applications of submarines.

For the immediate future the program emphasis will be to develop a baitfish capture and holding facility for the Hawaiian skipjack fishery.

A project outline has been completed. Basically, the project will involve experimental work with various types of traps and lift nets to catch nehu, the naturally occurring baitfish in Hawaiian waters. This phase of the study is expected to be completed by February 1968. At that time, sufficient data should be available to determine the future course of the project.

If traps and lift nets can be effectively utilized to catch reheu, the second phase will involve the establishment of a pilot-scale baitfish facility. The second phase will extend over two fishing seasons and will continue through September 1960. If the second phase is successful, the application of a full-scale baitfish facility will be carried out by the fishing industry with technical assistance from this Laboratory.

Progress on the project during the quarter consisted of (1) construction of a raft to be used as a work platform, (2) fabrication of a fish trap, (3) completion of arrangements to carry out the first phases of the experimental work in restricted waters off the Marine Base in Kaneohe Bay.

Experimental longline fishing at night was carried out on CHARLES H. GILBERT cruise 191 in May-June. The objective of the cruise was to determine if the availability of broadbill swordfish in Hawaiian waters was large enough to support a specialized fishery for this species.

Although the catch rates attained on the cruise were higher than the catch rates made by commercial boats operating in daylight hours, the catches at night were not high enough to recommend the establishment of a separate fishery for broadbill swordfish.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Fishery Development

Project Title: Develop fisheries for non-tuna other resources

Period Covered: April, May, June, 1967 (FY-67)

Acting Project Leader: Richard S. Shomura Date JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity during the quarter.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Fishery Development

Project Title: Develop high-seas tuna fishery

Period Covered: April, May, June, 1967 (FY-67)

Acting Project Leader: Richard S. Shomura Date JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity during the quarter.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Fishery Development

Project Title: Increase efficiency of Hawaiian longline fishery

Period Covered: April, May, June, 1967 (FY-67)

Acting Project Leader: Richard S. Shomura Date JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

During the quarter an attempt was made to increase the fishing base of the Hawaiian longline fishery. On Charles H. Gilbert cruise 101 (May-June 1967) longline fishing for broadbill swordfish was carried out on 22 nights in Hawaiian waters. Past records of commercial longline catches made from the daytime fishery in Hawaii showed peak broadbill landings in May-June. Since broadbill fishing in other areas (northeast coast of continental U.S. and Japan) is normally conducted during the night, the objective of the cruise was to determine if increased catches could be made by night fishing.

Only six broadbill ranging in size from 22 to 448 pounds were caught on the cruise. The catch rate of 0.088 broadbill per 100 hooks was considerably higher than the 0 to 0.001 per 100 hooks for the commercial boats operating during the daytime in the same area. Although the difference was statistically significant, the catches were not large enough to recommend application of this method of fishing to the commercial fleet.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Fishery Development

Project Title: Increase efficiency of Hawaiian skipjack fishery

Period Covered: April, May, June, 1967 (FY-67)

Acting Project Leader: Richard S. Shomura Date: JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

The project to develop a baitfish capture and holding facility for the Hawaiian skipjack fishery was given top priority in the Fishery Development Program. A preliminary evaluation of the fishery indicated that the establishment of an efficient baitfish fishery which did not directly involve the fishermen or the tuna boats would significantly increase the annual skipjack landings. The tuna boats presently carry out their own baiting operations and this non-tuna fishing activity measurably reduces the time available for fishing. The potential increase in skipjack landings as a result of a separate baitfish fishery has been estimated to exceed 5 million pounds annually.

Progress on the project during the quarter included (1) construction of a raft to be used as a work platform, (2) fabrication of a net for a baitfish trap, and (3) completion of arrangements to conduct the first phases of the experimental work in restricted waters off the Marine Base in Kaneohe Bay.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Fishery Development

Project Title: Explore fishery and research applications of submarines (131.110A)

Period Covered: April, May, June, 1967 (FY 67)

Acting Project Leader: Richard S. Shomura Date JUL 27 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity since the resignation of the project leader in March.

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QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Oceanography

Period Covered: July, August, September 1967 (FY-63)

Program Leader: Gunter R. Seckel Date: OCT 30 1967

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

Regional or Area Director J. E. Marr Date OCT 30 1967

Branch Chief J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Error analysis and editing have been completed for the 110,000 marine surface meteorological observations for the period July 1963 through June 1965 which will be used in the analyses of the TWZO pilot study.

Pilot study station data are being analyzed to determine changes in the salt, heat and mass within each of the major layers which make up the vertical structure. This involves, among other things, a correction for isostatic adjustment of the sub-surface layers in response to changes in the thickness of the uppermost layer. Isostatic adjustment and mean salt content calculations have been completed.

Anomalous early warming and dilution at Koko Head earlier this year were followed by a five-month period in which little change occurred. Fall cooling and increase in salinity were delayed approximately one month beyond normal.

Studies of Pacific-wide currents relative to an arbitrary reference surface at 1,000 m. have been completed for the third quarter Atlas data. Preliminary results suggest that at least half of the total flow above 1,000 m. takes place

in the upper 200 m., and that sub-surface countercurrents may exist in some middle and low latitude regions. The total integrated flow between 0 and 1,000 m. appears to agree very well with that calculated from wind stress data.

The "Oceanographic Atlas of the Pacific Ocean" is scheduled to be published in March of next year. A manuscript on the nature of the Kuroshio-Oyashio front has been accepted for publication, while another manuscript entitled "Probability paper analysis of polymodal frequency distributions using a computer" was sent out for scientific review.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Oceanography

Project Title: Determine average annual and seasonal Pacific oceanographic conditions /Atlas/ (131.32)

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Richard A. Markley Date: OCT 30 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Project completed. Publication of Atlas scheduled for March 1968.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Oceanography

Project Title: Investigate factors determining distribution of physical and chemical properties of the Pacific Ocean (131.06)

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Richard A. Barkley Date OCT 30 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Geostrophic currents and mass transport, relative to an arbitrary reference level at 1,000 db (or meters), for the fourth quarter of the year are being examined to determine how well they account for the observed distributions of properties on the Atlas charts, and how they agree with other information such as observed sea surface currents and calculated transport due to winds. Indications are that the 1,000 db reference level is adequate for most areas, except for the lowest latitudes, where a shallower reference surface might be preferable, and in the Kuroshio and northernmost reaches of the Pacific, where deeper reference surfaces look better. Results to date indicate that at least half of the total flow above 1,000 m. takes place in the upper 200 m.; that the total flow from the sea surface to 1,000 m. agrees very well with Reid's calculated transports for a corresponding time of year; and that some large-scale distortions of the total flow take place near the high islands of the Hawaiian chain. Several sub-surface countercurrents seem to be present in various middle and low latitude regions, but the flow in each case is thin, and the presence of such countercurrents will have to be confirmed by charts for other quarters of the year, for other choices of reference surfaces, and by independent measurements, before one can be sure that they are actually there. However, in a number of instances the supposed countercurrents account very nicely for oddities in the sub-surface distributions of salinity and oxygen.

Statistical analyses of the Atlas station data are progressing. Preliminary results have been obtained showing that seasonal changes on one sigma-t surface are significant in the western Pacific, but not in the eastern Pacific where the thermocline gradients are much sharper and shallower.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

~~Region~~ Area: Hawaii

Program Title: Oceanography

Project Title: Study association between trade wind system and North Pacific oceanographic climate /Porpoise/ (121.022)

Period Covered: July, August, September 1967 (FY 68)

Project Leader: Gunter R. Seckel Date

STATEMENT OF PROJECT ACCOMPLISHMENT

Editing and checking for errors has been completed for the marine surface meteorological data. The error rate was found to be about 1-2% for the 110,000 observations.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Oceanography

Project Title: Investigate seasonal variations, surface water types, Hawaiian area (Koko Head) (131.55W)

Period Covered: July, August, September 1967 (FY 68)

Project Leader: Gunter R. Seckel Date

STATEMENT OF PROJECT ACCOMPLISHMENT

Temperature at Koko Head remained at or above 26° C. throughout the quarter, with unusually constant salinities of 34.69 to 34.82 °/₀₀ for the entire period. Although the final analysis of these data must await Mr. Seckel's return from leave, it would appear that warm, low salinity water entered the island region early this year and has remained in the area about a month longer than usual.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Oceanography

Project Title: Conduct pilot study of limited portion of TWZO area (data and determinable results) (131.99E)

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Gunter R. Seckel Date: OCT 30 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Oceanographic station data from the pilot study were processed to determine the isostatic adjustments which occur in the deeper layers as these respond to changes in the thickness of the surface layer; the surface layer in turn adjusts to changes in the magnitude and direction of the surface wind stress. Along 148° W, when the isostatic effects are filtered out, disturbances with a northward travelling component were detected; the nature of these disturbances has not yet been determined.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Oceanography

Project Title: Analyse and publish basic data from pilot pilot study (analytic studies) (231.909)

Period Covered: July, August, September, 1967 (FY-68)

Project Leader: Gunter R. Seckel Date OCT 30 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Average salinities for various sub-surface layers were determined as part of the data analysis.

A computer program has been completed which calculates velocities, mass-, heat-, and salt-transport between any pair of stations and between any two sigma-t surfaces.

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File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Area: Hawaii

Program Title: Behavior-Physiology

Period Covered: July, August, September 1967 (FY-68)

Program Leader: John J. Magnuson Date: OCT

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

Regional or Area Director J. C. Marr Date _____

Branch Chief J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Five species of live bait were tested for skipjack fishing at sea. The threadfin shad, Dorosoma petenense, appeared to be the most promising. Greater activity was elicited with them from skipjack tuna and the catches were greater than with nehu (Stolephorus purpureus). Further tests are planned.

The behavior of the bait was observed at sea and in the shoreside tanks. The sounding behavior of the bait is very important in that if present it takes the skipjack away from the surface. Tilapia were observed to sound rapidly, while nehu and threadfin were observed to sound slowly and remain somewhat near the surface especially when pursued by skipjack.

Vertical movement of skipjack and yellowfin tuna in surface schools was determined from CTFM sonar records. The rate of vertical movement for skipjack averaged 0.3 m./sec. and ranged from 0 to 3.3 m./sec.

Procedures for retrieval and processing of CTFM sonar data, to be recorded automatically on tape starting in January, were begun.

The following manuscripts were submitted to the FAO Conference on Fish Behaviour in Relation to Fishing Techniques and Tactics, Bergen, Norway, October 19-27, 1967:

Magnuson. Swimming activity of the scombrid fish Euthynnus affinis as related to search for food.

Nakamura. A review of field observations on tuna behaviour.

Nakamura. Visual acuity of yellowfin tuna Thunnus [illegible].

Yuen. Response of skipjack tuna [illegible] to environmental changes in pole-and-[illegible] fishing operations.

The following manuscript was published:

Sather, B. T. and T. A. Rogers. 1967. [illegible] of the muscle and blood of oceanic skipjack [illegible]. Pacific Science 21(3):404-413.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

~~Region or~~ Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Investigate response of tunas to underwater sound (111.43C)

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Robert T. B. Iversen Date OCT

STATEMENT OF PROJECT ACCOMPLISHMENT

A first draft of the manuscript entitled "Response of the scombrid fish Euthynnus affinis to underwater sound" was completed.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

~~Region~~ Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Investigate visual acuity in tunas and related species (131.42)

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Eugene L. Nakamura Date

STATEMENT OF PROJECT ACCOMPLISHMENT

Manuscript accepted for publication by Copeia:

Nakamura, E. L. Visual acuity of two tunas, Katsuwonus pelamis and Euthynnus affinis.

Manuscript sent to Rome for FAO Conference on Fish Behaviour in Relation to Fishing Techniques and Tactics and accepted for publication:

Nakamura, E. L. Visual acuity of yellowfin tuna, Thunnus albacares.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin [illegible]

Regional Area [illegible]

Program Title [illegible]

Project Title [illegible]

Period Covered July, August, September 1967 (FY-68)

Project Leader John J. Magnuson Date [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

Accepted for publication by FAO Conference on Fish Behaviour in Relation to Fishing Techniques and Tactics, Bergen, Norway:

Magnuson, J. J. Swimming activity of the scombrid fish, [illegible] affinis, as related to search for food.

Yuen, H. S. H. Response of skipjack tuna (Katsuwonus pelamis) to experimental changes in pole and line fishing operations.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

~~Region~~ Area: Hawaii

Program Title: [illegible]

Project Title: [illegible] and relative abundance of [illegible] and related species (131.43E)

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Eugene L. Nakamura Date OCT

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Investigate behavior and ecology of tunas and other animals associated with floating objects at sea (131.6)

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Reginald M. Gooding Date

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity.

Form 2-119a(Sept.1960)

UNITED STATES DEPARTMENT OF THE INTERIOR
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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

~~Region~~ or Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Determination of [illegible] vertical and [illegible] distribution of tunas and related species (131.421)

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Henry S. H. Yuen Date

STATEMENT OF PROJECT ACCOMPLISHMENT

The recording system to complement the CIFM sonar system, which was described in the last quarterly report, is scheduled for installation in the next quarter. In the meantime work on the procedures for retrieval and processing of recorded data has started. Completed during this quarter were the basic mathematical equations for: locating successive target positions in three-dimensional space relative to the ship's position at the initial contact, finding speed of target, recognizing when the target is on the horizontal axis of the sonar beam, and estimating target strength. Computer programs will be developed from these equations and others.

The three survey tracks running between Molokai and Oahu, between Oahu and Kauai, and just west of Niihau were repeated twice, at approximately monthly intervals during this quarter.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

~~Region~~ Area: [illegible]

Program Title: Behavior-Physiology

Project Title: Determine patterns and factors controlling [illegible]

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Henry T. H. Yuen Date

STATEMENT OF PROJECT ACCOMPLISHMENT

The rate of vertical movements of skipjack tuna from 12 schools averaged 0.3 m./sec. Rates ranged from 0 to 3.3 m./sec. The average rate of vertical movements of yellowfin tuna from five schools also averaged 0.3 m./sec. The yellowfin tuna rates ranged from 0 to 2.0 m./sec. The rate of movement toward the surface was the same as the rate of movement away from the surface.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

~~Region or~~ Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Neurological physiology of the tunas (131.437)

Period Covered: July, August, September 1967 (FY-68)

Project Leader: John J. Magnuson Date OCT

STATEMENT OF PROJECT ACCOMPLISHMENT

Published:

Sather, B. T. and T. A. Rogers. 1967. Some inorganic constituents of the muscles and blood of the oceanic skipjack Katsuwonus pelamis. Pacific Science 21(3): 404-413.

This work was done at the University of Hawaii under Contract No. 14-17-0003-66 with BCF, Honolulu.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin [illegible]

Region or Area Hawaii

Program Title [illegible]

Project Title [illegible]

Period Covered [illegible]

Project Leader [illegible] Date

STATEMENT OF PROJECT ACCOMPLISHMENT

Five species of bait were tested on Cruises 102 and 103 of the CHARLES H. GILBERT. The species, number of tests, and locations were:

Tilapia mossambica: 11 tests on 7 schools at Lanai.

Tilapia hornorumi (=*T. macrocephala*): 4 tests on 3 schools at Lanai.

Dussumieria perspicua: 12 tets on 6 schools at Lanai; 5 tests on 3 schools on the high seas.

Notemigonus crysoleucas auratus: 1 test on 1 school at Lanai.

Puntius javanicus: 4 tests on 3 schools at Lanai.

Of the five species of bait tested, *D. perspicua* showed the most promise. Greater activity from skipjack tuna was elicited, and also, catches of skipjack tuna with this bait were greater than with aku (*Katsuwonus pelamis*), the baitfish used by commercial fishermen.

When the bait is chummed to bring a school of tuna to the surface and eventually to the stern of the vessel, surface breaks are normally detected in the ship's wake. This is the first overt recognition of the reaction of tuna to the bait, such as when aku are chummed. But when *T. hornorumi* and *Puntius* were chummed, no surface breaks were seen. The tuna appeared suddenly

at the stern of the vessel. In one instance when Puntius was chummed, the tuna's presence was detected by the catch of a skipjack by one of the fisher-

The first results from analyses of [illegible] behavior were obtained. A student, Kimberly Horn, under the [illegible] Science Apprentice Program, spent 7 weeks in July and August study[illegible]. The motion pictures, taken at Kewalo, were of nehu and T. [illegible] predation by Euthynnus affinis. Tilapia sounded when they were chum[illegible] the water, whereas nehu [illegible] of excitation, in E. affinis was greater when preying upon nehu than upon tilapia. The use of water sprays on the surface of the tank did not affect the attack rate and tail beat rate. It did significantly affect the time from chumming to the first successful attack rate on nehu. Water sprays lengthened this [illegible]

A paper entitled "Food stimuli of tuna; implications for the study of [illegible]" was presented by S. T. Iversen at the 97th Annual Meeting of the American Fisheries Society in [illegible]. [illegible] visited [illegible], ECF Laboratory in Ann Arbor, New York Aquarium, and Steinhart [illegible] San Francisco, where valuable information was obtained on bait [illegible]. [illegible] hakoensis, a cyprinid with wide tolerances for salinity and temperature. This fish spawns in both fresh and salt water, is a vigorous swimmer, and has a [illegible] quality. [illegible] board and also some of the characins.

[illegible] draft of a [illegible] of Behavioral data on Hawaiian species of Stolephorus was completed by E. L. Nakamura.

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File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

~~Region~~ Area: Hawaii

Program Title: Tuna Ecology

Period Covered: July, August, September 1967 (FY-68)

Acting / Program Leader: Tamio Otsu Date: OCT 30 1967

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

~~Regional~~ Area Director J. C. Marr Date _____

Branch Chief J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Eighty-three 6-hour tows with the small-mesh midwater trawl in the lee of Oahu, Molokai, Lanai, and Hawaii resulted in the capture of approximately 902 larval, postlarval and juvenile tunas. Blood samples were collected from 18 juvenile little tunny and frigate mackerel, 98-188 mm. FL, but attempts at collecting blood from juveniles smaller than these were unsuccessful.

The summer skipjack scouting and fishing observational program was successfully completed.

The Hawaiian skipjack catch for the third quarter of 1967 was estimated at 4,[illegible],000 pounds, 367,000 pounds below the 1948-66 average for the same period.

(Observation of egg pigmentation in larval mass was used to approximately 140 centimeters of all species except in salmonid eggs and produced per week).

The remaining "distribution, apparent mortality, and life cycle[illegible] of [illegible] (Tapeworm eggs) [illegible] [illegible] [illegible] by this and [illegible] [illegible] [illegible] submitted to the Technical Editor and Director of [illegible].

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Tuna Ecology

Project Title: Investigate ecology of skipjack and yellowfin (131.44A)

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Brian J. Rothschild Date

STATEMENT OF PROJECT ACCOMPLISHMENT

Field work to capture juvenile tunas with a small-mesh modified Cobb Pelagic Trawl occupied the entire quarter. Eighty-three 6-hour tows in the lee of Oahu, Molokai, Lanai, and Hawaii resulted in the capture of approximately 982 larval, postlarval, and juvenile tunas (7-160 mm. FL). Of this total, 268 were taken off Waianae, Oahu in 36 tows, 526 off Barbers Point, Oahu in 29 tows, 197 off Kona, Hawaii in 12 tows, and 1 off Molokai in 2 tows. None was taken in 4 tows off Lanai. The species captured included skipjack tuna, yellowfin tuna, bigeye tuna, albacore(?), little tunny, and frigate mackerel.

Blood samples were collected from 10 juvenile little tunny and frigate mackerel (96-168 mm. FL.) but attempts at collecting blood samples from juveniles smaller than these were unsuccessful.

Two shallow tows under a floating night light caught twice the number of tunas taken in two shallow tows without night light.

One set of the experimental miniature longline caught no fish and resulted in a mass of tangle.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

~~Region~~ or Area: Hawaii

Program Title: Tuna Ecology

Project Title: Investigation, systematics and ecology of tuna larvae and [illegible]

Period Covered: July, August, [illegible]

Project Leader: Walter M. Matsumoto Date: OCT 30 1957

STATEMENT OF PROJECT ACCOMPLISHMENT

Six weeks were spent in preparing for and participating in Cruise 32 using plankton net and midwater trawl tows for larval and juvenile tunas. All plankton and trawl net catches were examined for tunas at sea and samples of whole fish and eye lenses were frozen for electrophoretic analyses. Observations of red pigmentation in tuna larvae were made on approximately 840 specimens. The unfrozen specimens were preserved in formalin and [illegible] CP 40, a color preservative.

Collection of frozen samples for electrophoretic analyses included 42 eye lenses and 23 whole yellowfin, 34 eye lenses and 12 whole bigeye, 3 lenses and 3 whole albacore (?), 54 lenses and [illegible] whole skipjack, 19 lenses and 11 whole little tunny, and 89 lenses and 29 whole frigate mackerel.

Work continued on the first draft of the manuscript "Distribution and abundance of larval skipjack and yellowfin tuna in the central Pacific Ocean east of the 180th meridian."

Proof sheets were prepared and page proof of the manuscript "Morphology and distribution of larval wahoo, Acanthocybium solandri (Cuvier), in the central Pacific Ocean" was reviewed.

Invitations concerning their willingness to participate as members of a Working Group on Larval Tuna Identification under the FAO Expert Panel for the Coordination of Tuna Research were sent to Mr. W. Klawe, Dr. W. Richards and Dr. S. Ueyanagi.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin [illegible]

Region or Area Hawaii

Program Title Tuna Ecology

Project Title [illegible]

Period Covered [illegible]

Project Leader [illegible] Date [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

The quarter was characterized by poor fishing for skipjack and yellowfin in Palauan waters. There was, however, one to two weeks in August when fishing improved considerably and the Chinese vessels were reportedly landing up to 25 tons per night. Among the reasons given for the poor fishing were scarcity of baitfishes, bad weather, and abundance of natural food for skipjack on the fishing grounds.

Field station personnel in Palau measured 3,149 skipjack, 11 yellowfin tuna, and 302 Palauan scads (Selar crumenophthalmus). They also collected 11 quarts of baitfish samples, 47 skipjack ovaries, and 338 blood samples, and weighed and sexed 206 skipjack.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Tuna Ecology

Project Title: [illegible]

Period Covered: July, August, September 1[illegible]

Project Leader: [illegible] Date [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

During the quarter our field section at Honolulu Fo[illegible] sampled the length, weight and sex of 10,764 albacore from [illegible] trip landings by Japanese, Korean and Chinese vessels. Catch and effort data from 250 trips were received through the cooperation of the vessel operators. The average catch rate during the period was 4.9 fish per 100 hooks, and the fish averaged 92.1 cm. in length.

The manuscript "Distribution, apparent abundance, and size composition of albacore (Thunnus alalunga) taken in the Japan-based longline fishery, 19[illegible]-[illegible]" by Otsu and Sumida was revised and prepared for submission to Washington.

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QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Area: Hawaii

Program Title: Subpopulations

Period Covered: July, August, September 1967 (FY-68)

Program Leader: Kazuo Fujino Date: OCT 30 1967

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

Area Director J. C. Holt Date _____

Branch Chief J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Data for skipjack subpopulation study were collected on Charles H. Gilbert Cruise 104 from waters of the Line Islands.

A total of 1,939 skipjack blood specimens were collected from the northwestern Pacific (by NMFS Fishery-Oceanography Center); Hawaii, Line Islands, Samoa, Tahiti (by our Laboratory staff), and Japan (by Dr. A. Suzuki, Tokai Regional Fisheries Research Laboratory, Tokyo, under the CTK program), have been processed for blood groups and electrophoretic analyses.

Through an agreement with Mr. T. Kamimura of the High Seas Fisheries Research Laboratory, the first blood sampling kit was sent to him for making a series of collections of skipjack blood samples from Japanese coastal waters. A similar arrangement is being made with Mr. J. Isa, U.S. Civil Administration, Ryukyu Islands, to make a series of collections of skipjack blood samples from Okinawan waters. A sampling kit has been sent to Mr. Isa.

Efforts were made to establish techniques for bleeding and preserving blood specimens of postlarval and juvenile skipjack on Townsend Cromwell Cruise 42.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

~~Region~~ Area: Hawaii

Program Title: Subpopulations

Project Title: Investigate tuna subpopulations through the use of blood groups and inherited proteins (131.47D)

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Kazuo Fujino Date: OCT 2 - 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

Data for skipjack subpopulation study were collected from 615 fish on CHARLES H. [illegible] Cruise 104 from waters of the Line Islands. In addition, a total of 1,324 skipjack blood specimens was collected from the northwestern Pacific, North and South Central Pacific, and the western Pacific.

Some of the current results among many of the analyses of these samples follow:

1. Serum samples taken from Palauan fish indicated useful electrophoretic patterns for both the serum esterase and transferrin systems.

2. Frequency of an allele (T^1) of serum esterase system of the Samoan sample was markedly different from those taken from the northwestern Pacific and Hawaiian waters, but was close to that of a sample taken from the southwestern Pacific (see figure). This suggests that the serum esterase system is a useful indicator in comparing genetic compositions of skipjack population(s) in the northern and southern Pacific Ocean.

3. No seasonal change in genetic composition (blood groups and serum groups) has been observed in Palauan samples since the beginning of the sampling in November 1966.

An effort was made to establish techniques of bleeding and preserving blood specimens of postlarval and juvenile skipjack on Townsend Cromwell Cruise 72.

[illegible] pulati[illegible] ogram (131.47D) - [illegible]

[illegible]

[illegible] ardena

[illegible] by punch-[illegible] combination:

[illegible] and Krug. [illegible]

[illegible] of editor of the [illegible]

[illegible]. A review of [illegible] compilation [illegible].

Sent to editor of G[illegible]:

Fujino and Kenz. [illegible] plugs of [illegible].

Sent to Technical Editors:

[illegible] and Fujino. The [illegible] of subject and [illegible].

In preparation:

Fujino and Fujino. The [illegible] system of subject and [illegible].

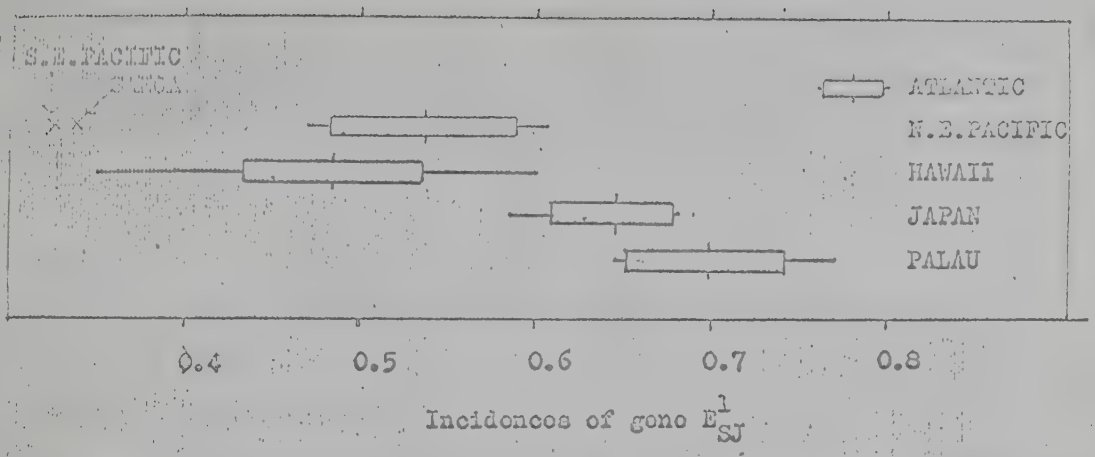

Figure Frequencies of an allele, E^1_{SJ}, of skipjack tuna serum esterase system (8,913 fish).

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolu[illegible]

~~Region~~ Area: [illegible]

Program Title: [illegible]

Project Title: [illegible]

Period Covered: [illegible] 1967 (FY-68)

Project Leader: Kazuo Fujino Date

STATEMENT OF PROJECT ACCOMPLISHMENT

In addition to the specimens taken in Charles H. Gilbert Cruise 18, a total of 1,314 blood specimens of [illegible] were collected by cooperative efforts of various organizations, as well as by our laboratory staff, as follows:

Area	No. of blood specimens collected	Collected by
Northwestern Pacific	214	Fishery-Oceanography Center, La Jolla
Central Pacific		Laboratory staff
Hawaii	588	" "
Samoa	35	" "
Western Pacific		
Palau	357	Laboratory staff
Japan	130	Dr. A.Suzuki, Tokai Regional Fisheries Research Laboratory, Tokyo*

*Under arrangement with CSK.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin Biological Laboratory, Honolulu

Region or Area [illegible]

Program Title [illegible]

Project Title [illegible]

Period Covered [illegible]

Project Leader Kazuo Fujino Date [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity for the quarter.

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File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Area: Hawaii

Program Title: Fishery Development

Period Covered: July, August, September 1967 (FY-68)

Program Leader: Richard S. Shomura Date: [illegible]

Reviewed by:

Chief, Field Station or Office of Origin _____ Date _____

Regional or Area Director: J. C. Marr Date _____

Branch Chief: J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Program personnel continued to devote much of their time and effort on the baitfish project. Collection of baitfish [illegible] data summarized on Report 1. The fish weir installed in a restricted area of Kaneohe Bay was found to be successful in catching baitfish (Stolephorus purpureus). The catches, however, were highly variable, ranging in amount from about 1 bucket of baitfish (9-10 pounds of baitfish per bucket) to 167 buckets. Cause of variability was not determined.

The night lift net, which represents a second method of catching baitfish, was tried during the quarter without much success. Catches ranged from less than 1 bucket of baitfish to a high of 16 buckets. Future work on this gear will involve changes in location and the use of a rheostat to reduce light intensity, thereby concentrating the fish.

Preliminary studies and plans to carry out some field work on a new bottom handline project in Hawaiian waters was initiated during the quarter. On the basis of the extent of potential unexplored grounds in the Hawaiian Archipelago, a yield of more than 20,000 metric tons of fish and invertebrate

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Fishery Development

Project Title: Develop fisheries for non-tuna resources

Period Covered: July, August, September 1967 (FY -68)

Project Leader: Howard O. Yoshida Date: OCT 30 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

During the latter part of the quarter, plans were developed to conduct an exploratory bottom trawling cruise in Hawaiian waters to determine the commercial fishing potentials of the benthic fish and invertebrate resources. To date very little is known of the bottom resources of the Hawaiian archipelago. The Albatross in 1902 conducted a limited bottom trawl survey using beam trawls. Since the advent of modern sonar gear and improvements in bottom trawl fishing gear, an evaluation of the commercial aspects of the benthic resources in the Hawaiian archipelago seemed appropriate at this time.

Examination of bottom contour charts shows 5,113 square nautical miles of bottom between 10 and 400 fathoms around the main Hawaiian Islands, and 7,[illegible] square nautical miles between 10 and 400 fathoms around the Leeward Islands. Using an annual yield of 1.5 metric tons per square nautical mile, a figure considered low for existing trawl fisheries, and assuming only 1/3 potential at the bottom between 10 and 100 fathoms as trawlable, the potential annual yield was estimated to exceed 10,000 metric tons for the Hawaiian archipelago.

Exploratory bottom trawl fishing is scheduled to be conducted from October 24 to November 16 on Townsend Cromwell Cruise 33. Trawl hauls will be made in selected areas around the main islands of the Hawaiian chain using one of Honolulu Biological Laboratory's otter trawl nets and the eastern otter trawl nets. The gear is on loan from the Exploratory Fishing and Gear Research Base, Seattle, Washington.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Regional Area: Hawaii

Program Title: Fishery Development

Project Title: Increase efficiency of Hawaiian skipjack fishery

Period Covered: July, August, September 1967 (FY-68)

Project Leader: Thomas S. Hida Date: OCT

STATEMENT OF PROJECT ACCOMPLISHMENT

Monitoring of the Tweedie anchovy (*Stolephorus purpureus*), which made entry into the fish weir installed near the Marine Base in Kaneohe Bay commenced on August 1. On the basis of trapping, baitfish in shallow water (1-3 ft) in the early morning hours, the movement of these fish into the weir probably occurs during daylight hours. Since the baitfish have to be kept alive, the usual method of removing fish from the weir by seining was not considered optimal and a method which utilizes the sensory (positive) response of the baitfish to light was developed. The procedure involved attracting the anchovy around a submerged light source (low intensity bulb) in the middle of an impoundment bag. When a sufficient quantity of baitfish are observed milling around the light the pole to the impoundment bag is lifted. The entrapped baitfish are then led into a bait receiver.

The results to date have been highly variable, ranging from less than 1 bucket of baitfish (8-10 pounds of baitfish per bucket) to a high of 100 buckets. By way of reference, the average Hawaiian skipjack fishing boat carried about 30 buckets of baitfish on a single fishing expedition. A fishing trip is generally of 1-day duration. The cause of the high variability in catch rates is not presently known; however, some environmental data (temperature, salinity, and oxygen) are being routinely collected to investigate possible environmental influences in the baitfish distribution.

Two other fish weirs were fabricated and installed in other sectors of Kaneohe Bay in late September. These weirs are expected to be operational in early October.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin [redacted]

Region or Area [redacted]

Program Title Fishery Development

Project Title Increase efficiency of Hawaiian longline fishery

Period Covered July, August, September 1967 (FY-68)

Project Leader Richard S. Shomura Date OCT 30 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Fishery Development

Project Title: Develop high-seas tuna fishery

Period Covered: [illegible]

Acting Project Leader: [illegible] Date

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity during the quarter.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

~~Region or~~ Area: Hawaii

Program Title: Fishery Development

Project Title: [illegible] (131.1R3A)

Period Covered: July, August, September 1967 (FY-68)

Acting Project Leader: Richard S. Shomura Date OCT 30 1967

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity during the quarter.

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File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or
Office of Origin Biological Laboratory, Honolulu

Area Hawaii

Program Title Oceanography

Period Covered October, November, December 1967 (FY-68)

Program Leader Gunter R. Seckel Date JAN 8 1968

Reviewed by:

Chief, Field Station
or Office of Origin _____ Date _____

Area Director J. C. Marr Date FEB 12 1968

Branch Chief J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

Program activities during the quarter were concerned primarily with Pacific-wide studies of the factors determining physical and chemical properties and processing of TWZO pilot study meteorological data.

Charts showing the dynamic topography, acceleration potential and transports in various layers relative to the 1,000 db surface in the third quarter of the year were prepared.

Studies of the statistical properties of Atlas data were continued. These include two-parametric analyses of variability at various sigma-t surfaces throughout the Pacific, and statistical correlation analyses to compare distributions of oceanographic properties with the distribution of fish catch as shown in Nakamura's Atlas.

A manuscript on the Kuroshio-Oyashio front was accepted for publication in the Journal of Marine Research.

In preparation for the computation of meteorological processes at the sea surface in the TWZO pilot study a variety of preliminary ADP tests are being performed: first to fit surfaces to the observed meteorological data, and second, to select heat exchange formulae suitable for use in the trade wind zone.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Oceanography

Project Title: Determine average annual and seasonal Pacific oceanographic conditions /Atlas/ (111.3)

Period Covered: October, November, December 1967 (FY-68)

Project Leader: Richard A. Barkley Date: JAN 26 1968

STATEMENT OF PROJECT ACCOMPLISHMENT

Project completed. Publication of Atlas scheduled for March 1968.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin [illegible]

Region or Area [illegible]

Program Title [illegible]

Project Title [illegible]

Period Covered [illegible]

Project Leader [illegible] Date JAN 2 [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

Charts showing the dynamic topographic and reclamation potentials of the sea surface, the 200 m. and 400 depth surfaces, and two sigma-t surfaces during the third quarter of the year were completed. At the same time, charts showing mass transports between various levels were prepared from the same data. All of these charts show conditions relative to the 1,[illegible]0 m. (1,000 decibar) surface. Other charts of the same surfaces, but relative to other reference levels, are being prepared as well, to permit comparison of the relative agreement obtained (with different choices of reference level) between these dynamic charts and the false charts showing distributions of salinity and oxygen, which can be considered as tracer elements.

The MS on the Kuroshio-Oyashio front was accepted for publication in the Journal of Marine Research; it went to press in mid-November.

Studies are under way of the statistical properties of the Atlas data. These include non-parametric analyses of variability at various sigma-t surfaces throughout the North Pacific, and statistical correlation analyses to compare distributions of oceanographic properties with the distribution of fish catch as shown in Nakamura's Atlas. The variability of salinity data shows the expected maximum near the sea surface, and then diminishes with increasing depth. However, an unexpected increase in variability takes place at still greater depths, well below the main thermocline. The spatial distribution of this secondary maximum in variability is being investigated; it appears to [illegible] between 10° and 15° N. This pattern of vertical variation in variability is remarkably uniform across the Pacific at any one latitude.

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UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin [redacted]

Region or Area [redacted]

Program Title [redacted]

Project Title Study association between trade wind system and North [redacted] climate [redacted]

Period Covered [redacted]

Project Leader [redacted] Date [redacted]

STATEMENT OF PROJECT ACCOMPLISHMENT

There has been no activity in this project during the quarter.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin Biological Laboratory, Honolulu

Region or Area [illegible]

Program Title [illegible]

Project Title [illegible]

Period Covered October, November, December 1967 (FY 68)

Project Leader [illegible] Date JAN 26 1968

STATEMENT OF PROJECT ACCOMPLISHMENT

There has been no activity in this project during the quarter.

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UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin Biological [illegible]

Regional or Area Hawaii

Program Title [illegible]

Project Title [illegible]

Period Covered October, November, December 1967 (FY-68)

Project Leader Gunter R. Seckel Date JAN 26 1968

STATEMENT OF PROJECT ACCOMPLISHMENT

[illegible] fitting surfaces to the observed meteorological distributions. Initially the tests are being conducted for the two-dimensional case using [illegible] data.

Formulae for the computation of heat exchange processes were also reviewed and computer programs were written for those suitable in the trade wind zone.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin [illegible]

Region or Area [illegible]

Program Title [illegible]

Project Title [illegible]

Period Covered [illegible]

Project Leader [illegible] Date [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

Analysis of the vertical ocean structure as it concerns dissolved properties, density, and geostrophic currents in the trade wind zone is continuing.

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File No._____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or
Office of Origin Biological Laboratory, Honolulu

~~Region~~ Area [illegible]

Program Title [illegible]

Period Covered [illegible]

Program Leader [illegible] Date [illegible]

Reviewed by:

Chief, Field Station
or Office of Origin _____ Date _____

~~Regional~~ Area Director [illegible] Date [illegible]

Branch Chief [illegible] Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

[illegible] fish. Skipjack tuna weighing about half a pound were recorded to depths of [illegible], while skipjack tuna weighing about 15-20 pounds were recorded to depths of [illegible]. The data were collected with the CIFM sonar from 15 schools of skipjack tuna.

The CIFM sonar was also used to collect data on echo strengths of the deep scattering layer and data to determine the reliability of measuring the movements of targets.

[illegible] capabilities at full speed of the ship. A system to record sonar and [illegible] was also installed. [illegible] and software for complete computer processing of sonar data by the summer of 1968.

be made.

tuna.

The following papers were presented at the FAO Conference on Fish Behaviour

J. J. Magnuson. Swimming activity of the scombrid fish Euthynnus affinis as related to search for food.

E. L. Nakamura. A review of field observations on tuna behavior.

E. L. Nakamura. Visual acuity of yellowfin tuna, Thunnus albacares.

experimental changes in pole-and-line fishing operations.

The following papers were published:

Japan and Asia. Proceedings of the Hawaiian Academy of Science, 42nd annual meeting.

R. M. Gooding and J. J. Magnuson. 1967. Ecological significance of a drifting object to pelagic fishes. Pacific Science, 21(4):486-497.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: [illegible]

Project Title: [illegible] and related species (131.4[illegible])

Period Covered: [illegible]

Project Leader: Henry S. H. Yuen Date: JAN 26 1968

STATEMENT OF PROJECT ACCOMPLISHMENT

Data collected from 18 schools of skipjack tuna this past June indicated a [illegible] they will go. Skipjack estimated to be half a pound went to a recorded 17 m. [illegible] would be a recorded 17½ m.

A [illegible] computer processing of sonar data will be [illegible] was installed on the CROMWELL. The IBM 1627 analog to digital [illegible] center. This equipment converts the data recorded on tape to a form suitable to the computer. Mrs. Keala received training [illegible] wrote a channel program for the IBM 1627.

In order to meet sonar scanning requirements, Straza Industries installed a new interchangeable hydrophone array. The new array consists of a new classify hydrophone and a rearrangement of the other transducers. The sonar now has full scanning capabilities at full ship's speed.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Investigate physiology of the tunas (131.43P)

Period Covered: October, November, December 1967 (FY-68)

Project Leader: Eugene L. Nakamura Date: JAN 26 196[illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity.

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Behavior-Physiology

Project Title: Determine alternate live-bait species

Period Covered: October, November, December 1967 (FY-68)

Project Leader: [illegible] Date [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

[illegible] pole-and-line fishing. Shad and nehu were alternated as live bait for 3-minute periods. Although the number (5) of fishing stations were few, the catch and [illegible] more trials are required for definitive conclusions.

Preparations have been made to import [illegible] testing: a euryhaline minnow (Tribolo[illegible]) from Japan, and a silverside (Menidia menidia) from the [illegible] coast of the U. S.

[illegible] entitled "Studies on the qualities of live bait" by R. T. B. Iversen [illegible] prepared and presented at the 11th Pacific Tuna Conference, Oct. 1967, at Lake Arrowhead, California.

E. L. Nakamura and R. T. B. Iversen prepared a report entitled "Bait resources of the central Pacific." E. L. Nakamura revised the following after internal review: "Synopsis of biological data on Hawaiian species of Stolephorus."

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File No. _____

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or
Office of Origin [illegible]

Region or Area [illegible]

Program Title [illegible]

Period Covered [illegible] (FY-68)

Acting
Program Leader [illegible] Date [illegible]

Reviewed by:

Chief, Field Station
or Office of Origin _____ Date _____

Regional or Area Director J. C. Marr Date [illegible]

Branch Chief J. E. King Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

The Pacific sardine catch for the fourth quarter was estimated at 1,400,000 pounds which is 181,000 pounds above the 1948-66 average for the [illegible]. In the other hand, the total 1967 landings were estimated at [illegible] pounds, which is 1,203,000 pounds below the long-term annual average.

[illegible] the summer shipboard fishery observational program was completed, keypunched and readied for analysis.

The most successful trawl tows for juvenile tunas during TOWNSEND CROMWELL Cruise 32 were made at shallow depths (10-20 m.) during the night and early [illegible]. The results suggested that young skipjack tended to stay around the surface as [illegible] approached, formed concentrations in shallow depths under the night, and dispersed to deeper waters in the morning. In the [illegible], yellowfin and bigeye tuna juveniles tended to remain concentrated at the surface at all times.

The [illegible] of larval tunas were prepared for electrophoretic analysis. This technique will be tested to see if it can be used for species identification.

Tuna Ecology Program -

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin [illegible]

Region or Area [illegible]

Program Title [illegible]

Project Title [illegible] Skipjack in Hawaii

Period Covered October, November [illegible]

Project Leader [illegible] Date [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

[illegible] skipjack [illegible]
[illegible] is nearly ready for submission to the Bureau editors.

[illegible] 1,0
[illegible] 19.7 1
[illegible] is 1,5

(over 15 pounds), 57 percent medium (8-15 [illegible] (5-8
pounds), and 2 percent extra-small (under 4 pounds) fish.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin Biological Laboratory, [illegible]

Region or Area [illegible]

Program Title [illegible]

Project Title [illegible]

Period Covered [illegible]

Project Leader [illegible] Date [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

During the quarter [illegible] and 1 albacore were sufficiently [illegible] for electrophoretic analysis of blood [illegible]. Samples for electrophoretic testing were prepared from 2 bigeye, 2 yellowfin, and 1 albacore [illegible] technique. Further tests are required to determine the correct buffer solution and optimum pH.

Lenses were removed from part of the frozen collection of bigeye and yellowfin tuna. Separating the lens from the rest of the eye was difficult, since the lenses were extremely small; their diameters ranged from 0.40 to 1.12 mm. The majority of the lenses were between 0.50 and 0.80 mm. in diameter.

Many of the lenses had deteriorated either prior to or during the freezing process. Only 76 of 129 lenses dissected were in apparently usable condition. These included 29 [illegible] lenses, 23 yellowfin lenses, 23 bigeye lenses and 1 albacore lens.

[illegible] leader was on a month's annual leave during the quarter.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin [illegible]

Region or Area [illegible]

Program Title [illegible]

Project Title Investigate tuna resources of the Trust Territories (131.44C)

Period Covered [illegible]

Project Leader [illegible] Date [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

Skipjack catches in Palau were generally poor in October and this was [illegible] decrease in fishing effort due to typhoon warnings. Fishing improved [illegible] skipjack instead of the usual 4-8 pound fish. A decrease in catch in early December was thought to be due to a change in the prevailing wind and ocean [illegible] week in December.

Of significance during the quarter was the beginning of a sustained skipjack tagging program in Palau. A total of 222 skipjack were tagged during the quarter. Three recoveries were reported. One tagged skipjack was caught [illegible] captured 15-20 minutes after release by the same vessel while fishing the same school, and a third was discovered at a cannery in Australia in a shipment of skipjack tuna received from Palau.

Field station personnel in Palau measured 2,033 skipjack tuna, sampled 200 [illegible] of baitfish, and 200 skipjack blood samples. They also measured the lengths of 1,100 Palauan nehu (Stolephorus heterolobus) prior to wrapping and shipping them back to the Laboratory.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

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BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin _____

Regional Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader Brian J. Rothschild Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

A [illegible] was made during the period of [illegible] of the [illegible] between [illegible] and [illegible]. [illegible] vast area, which also [illegible] of the Canary and Japan, were examined. This report is part of a [illegible] project on the fishery resources of the [illegible] Ocean.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader Bruce E. Higgins Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

[illegible] 1,000 postlarval and juvenile tunas were collected with the Anchovy [illegible] CALCOFI Cruise 32 completed early in October 1967. Considerable time was involved during the quarter in identifying and measuring the [illegible] in summarizing the results. About 60 percent of the yo[illegible] identified [illegible] tuna, bigeye tuna, [illegible] and little tunny.

The most successful tows were made at shallow depths (10-2[illegible] m.) [illegible] to move towardthe surface as darkness approached, [illegible] at shallow depths during the night, and dispersed to deeper waters in the [illegible] d to remain concentrated near the surface at all times.

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BUREAU OF COMMERCIAL FISHERIES

File No.

QUARTERLY PROGRAM PROGRESS REPORT

Field Station or
Office of Origin [illegible]

~~Region or~~ Area [illegible]

Program Title Subpopulations

Period Covered [illegible]

Program Leader Kazuo Fujino Date [illegible]

Reviewed by:

Chief, Field Station
or Office of Origin Date

~~Regional~~ Area Director J. C. Marr Date FEB 12 1964

Branch Chief J. E. King Date

STATEMENT OF PROGRAM ACCOMPLISHMENT

[illegible] Islands area last [illegible] samples were [illegible].

[illegible] re collected from the equator[illegible] [illegible]h and training vessel of the [illegible] by our Laboratory's staff), [illegible] Mr. T. Kamimura, Far Seas Fisheries Research [illegible] Mr. J. [illegible], U.S. Civil Administration Office [illegible].

[illegible]ata for skipjack subpopulation study from the western P[illegible] summarized together with the data from other parts of the [illegible] presented at the Symposium of Cooperative Study of Kuroshi[illegible] Regions to be held April 1963.

Frozen blood specimens of 4 albacore, 24 yellowfin, and 279 bigeye tunas were sent to Mr. G. Sharp, Fishery-Oceanography Center, La Jolla.

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Field Station or
Office of Origin _____

Research Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

[illegible] to those of the Hawaiian samples.

[illegible] genetic systems (blood group and serum group systems) in the [illegible].

[illegible] was seen in the known genetic [illegible] for locations).

[illegible] gene frequencies of samples from the western Pacific are significantly [illegible] than those of the central Pacific (Hawaii and [illegible]) and the eastern Pacific (Baja California) in heterogeneity test.

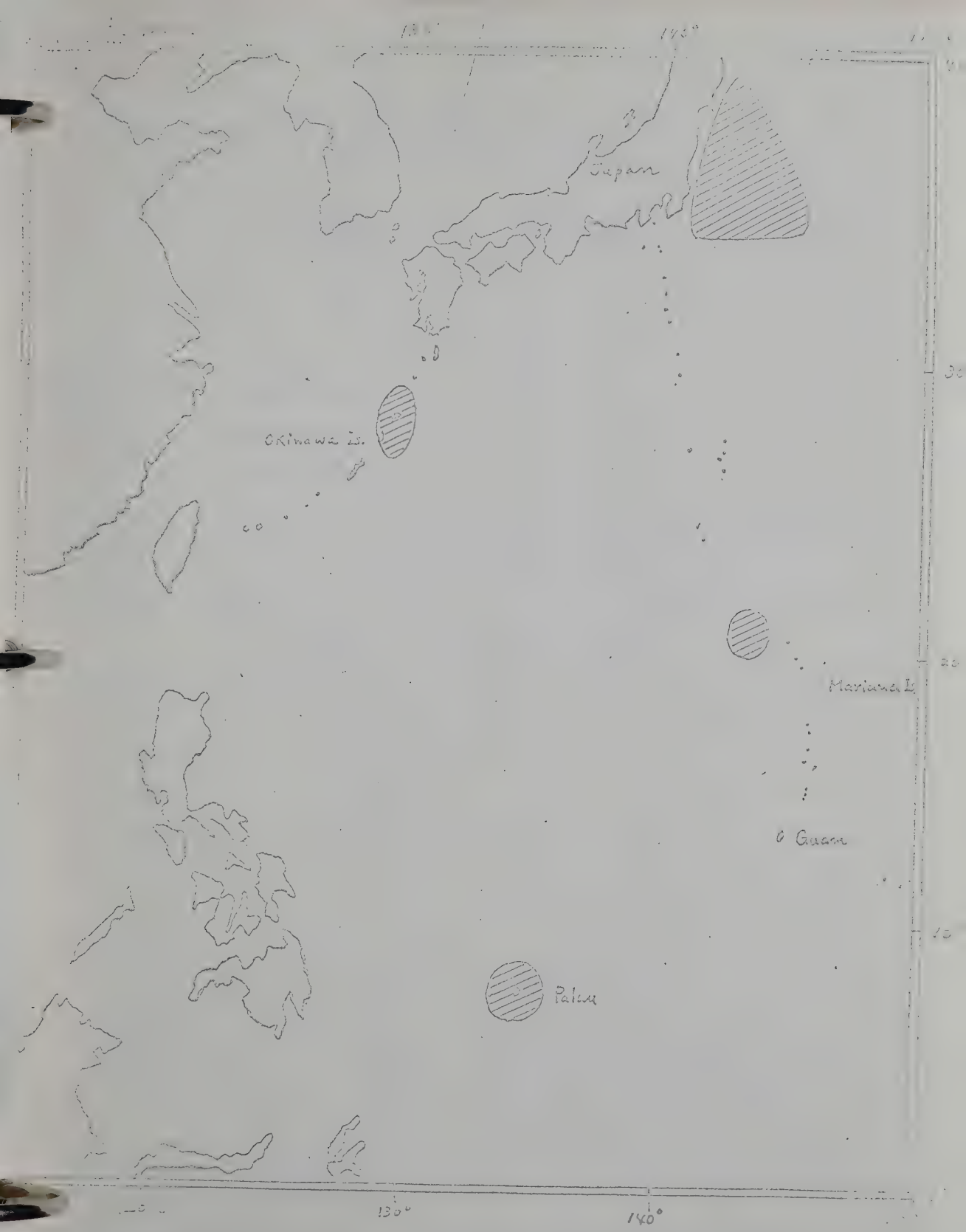

Figure Areas where skipjack blood specimens have been collected, shown as shaded area, in the western Pacific

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin [illegible]

Regional Area [illegible]

Program Title [illegible]

Project Title [illegible]

Period Covered [illegible]

Project Leader [illegible] Date [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

The following numbers of skipjack blood specimens were collected under the cooperation of various organizations as well as by our Laboratory's staff.

Area	Collected	
Equatorial eastern Pacific	[illegible]	[illegible]ntific staff of Nihondaigaku-go,
Central Pacific (Hawaii)	[illegible]	[illegible]
Western Pacific		
Palau	[illegible]	[illegible]
Mariana	[illegible]	Mr. T. Kamimura, Far Seas Fisheries
Japan, coast	[illegible]	Research Laboratory, Japan
Okinawa	[illegible]	Mr. J. Ise, U.S. Civil Admin., Ryukyu Islands.

In addition, blood specimens of 79 bigeye tuna were collected from equatorial eastern Pacific by Nihondaigaku-go.

A series of collection of skipjack blood specimens from Palauan waters, which began November 1966, was successfully terminated with the receipt of

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin Biological Laboratory, Honol

Area

Program Title

Project Title Investigate the genetics of fishes (131.47F)

Period Covered October, November, December 1967 (FY-68)

Project Leader Kazuo Fujino Date JAN 26 1968

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity for the quarter.

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QUARTERLY PROGRAM PROGRESS REPORT

Field Station or
Office of Origin Biological Laboratory, Honolulu

Area

Program Title

Period Covered

Program Leader Richard S. Shomura Date JAN 26 1968

Reviewed by:

Chief, Field Station
or Office of Origin _____ Date _____

Area Director J. [illegible] Date [illegible]

Branch Chief J. [illegible] Date _____

STATEMENT OF PROGRAM ACCOMPLISHMENT

A three-week bottom trawling cruise [illegible] successfully undertaken during the quarter on Townsend Cromwell [illegible]. Fifty-six drags were made with various sizes of Gulf of Mexico shrimp trawl nets, one 75-foot semi-balloon shrimp trawl net and one 400 mesh eastern otter trawl fish net. Fishing effort was concentrated in waters off Maui, Molokai, Lanai and Kawaihae, Hawaii. The depths fished ranged from about 60 fathoms to 300 fathoms. Approximately 660 square nautical miles of bottom were surveyed and on the basis of echo sounding traces, about 30 percent of the bottom was considered trawlable.

The demersal organisms which were taken in large numbers and which showed the best potential for the development of commercial fishing were shrimps and flatfishes. Four species of large size shrimps were caught during the survey. [illegible] the penaeids (Penaeus [illegible] and P. [illegible]) and [illegible] (Metapenaeopsis [illegible]). The drags were from 30 minutes to 2 hours duration. Tentative field identification indicated the presence of 3 species of flatfishes in the catch. The best catch was 11 pounds taken in one drag.

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or Office of Origin: Biological Laboratory, Honolulu

Region or Area: Hawaii

Program Title: Fishery Development

Project Title: Develop fisheries for non-tuna resources

Period Covered: October, November, December 1967 (FY-68)

Project Leader: Howard O. Yoshida Date: JAN 26 1968

STATEMENT OF PROJECT ACCOMPLISHMENT

During the quarter work was initated to investigate the demersal fish and invertebrate resources around the Hawaiian Islands. During Cruise 68-3 of the JOHN N. COBB (Oct. 24 to Nov. 15, 1967) a three-week period was devoted to bottom trawling in Hawaiian waters.

Since this was our first experience in bottom trawling, assistance was requested and obtained from the Exploratory Fishing and Gear Research Base, Seattle, Wash. Mr. H. Hayamoto and Captain R. Larsen (Master of the R/V JOHN N. COBB) from the Seattle Base participated in the first few days of the cruise to advise us in the use of various types of trawl gear.

From a trawling standpoint, very little information is available on the bottom configuration around the Hawaiian Islands. Therefore, before the demersal fish could be sampled during the cruise, "sounding" transects had to be made to determine the suitability of the bottom for trawling. Sounding surveys were made of approximately 700 square nautical miles of water around Molokai, Lanai, Maui, Kahoolawe, and off Kawaihae, Hawaii. The surveys indicated that about 30% of the bottom in the survey area was trawlable.

Hauls were made with 22-foot, 27-foot, 40-foot, and 43-foot Gulf of Mexico shrimp trawls, a Gulf of Mexico-type [illegible] trawl, a 400-mesh eastern rubber trawl, and a small "try" net. Of this total, 11 drags were unsuccessful because of: (1) the entire trawl was lost on one drag, (2) the nets were [illegible]

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FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin Biological Laboratory, Honolulu

Region or Area [illegible]

Program Title [illegible]

Project Title [illegible]

Period Covered [illegible] December 1967 (HK-69)

Project Leader Thomas S. Hida Date [illegible]

STATEMENT OF PROJECT ACCOMPLISHMENT

Field work on the baitfish [illegible] experiment in Kaneohe Bay were [illegible] during the quarter. Baitfish were caught from three fixed traps and one night lift net. In addition to the fixed trap installed near the Marine Base in July, two others were fabricated and installed at [illegible] and Kokokahi. All three sites are located in the southeastern [illegible] of the bay. [illegible] of 13 net lifts of baitfish were made at the Marine Base trap and 20 and 40 buckets taken at the Kokokahi trap, all of the [illegible] were juvenile jacks and [illegible] of baitfish. The results with the night lift net continued to be [illegible] and most of the catches were less than one bucket of baitfish per [illegible]. Poor location could be an important factor in availability of baitfish, thus the lift net was moved to a new site in mid-November. The catches at the new site were still too low for commercial fishing operations.

[illegible] were essential in early December after [illegible] daily [illegible] at the Marine Base in late November. Another storm in late December damaged the trap located at the Marine Base thus forcing us to abandon field work completely in late December.

During the quarter two modifications of baitfish catching devises were developed. In order to provide more rigidity to the traps constructed of [illegible] of galvanized "chicken" wire (1 inch mesh) was incorporated and installed in the Marine Base area.

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin Biological Laboratory, Honolulu

Fishermen Area Hawaii

Program Title Fishery Development

Project Title Increase efficiency of Hawaiian longline fisher

Period Covered October, November, December 1967 (FY-68)

Project Leader Richard S. Shomura Date JAN 25 1968

STATEMENT OF PROJECT ACCOMPLISHMENT

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QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin _____

Region or Area _____

Program Title _____

Project Title _____

Period Covered _____

Project Leader _____ Date _____

STATEMENT OF PROJECT ACCOMPLISHMENT

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File No._____

QUARTERLY PROJECT PROGRESS REPORT

Field Station or
Office of Origin Biological Laboratory, Honol[illegible]

Region or Area Hawaii

Program Title [illegible]

Project Title [illegible]

Period Covered [illegible]

Project Leader Richard S. Shomura Date JAN 26 1968

STATEMENT OF PROJECT ACCOMPLISHMENT

No activity during the quarter.

MAJOR PHYSICAL FACILITIES

LABORATORY AND HAWAII AREA OFFICE

The principal buildings of BCF, Hawaii, are located at 2570 Dole St., Honolulu, on 2.1 acres of land transferred to the Federal Government in 1949 by the State (then Territory) of Hawaii through Executive Order.

Main Building. A two-story concrete block (hollow tile) building constructed in 1950 at an estimated cost of $253,749. Net usable floor area--12,845 square feet, consisting of 8 laboratory work areas, 35 offices, a 5,000-volume library, a seminar room, and approximately 1,000 square feet of common use areas.

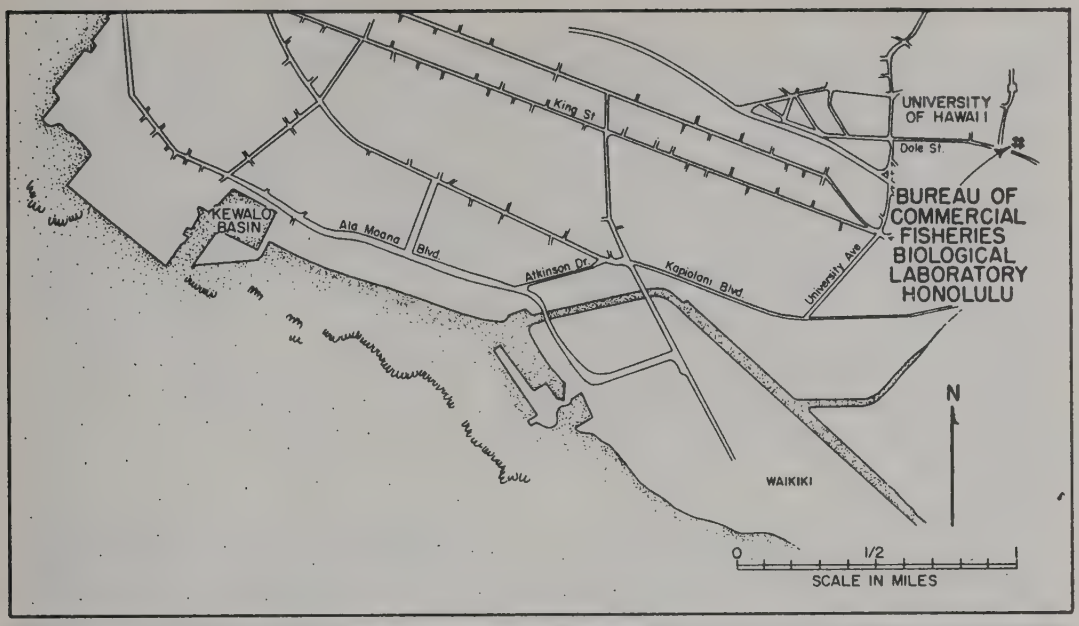
Annex. A one-story steel frame structure with block tile and corrugated asbestos siding, constructed in 1950 and altered in 1964, adjacent to main building. Estimated cost of construction and alteration, $105,785. Has a total of 5,452 square feet under roof. Contains three laboratory work areas, five offices, duplicating services area, warehouse, and garage.

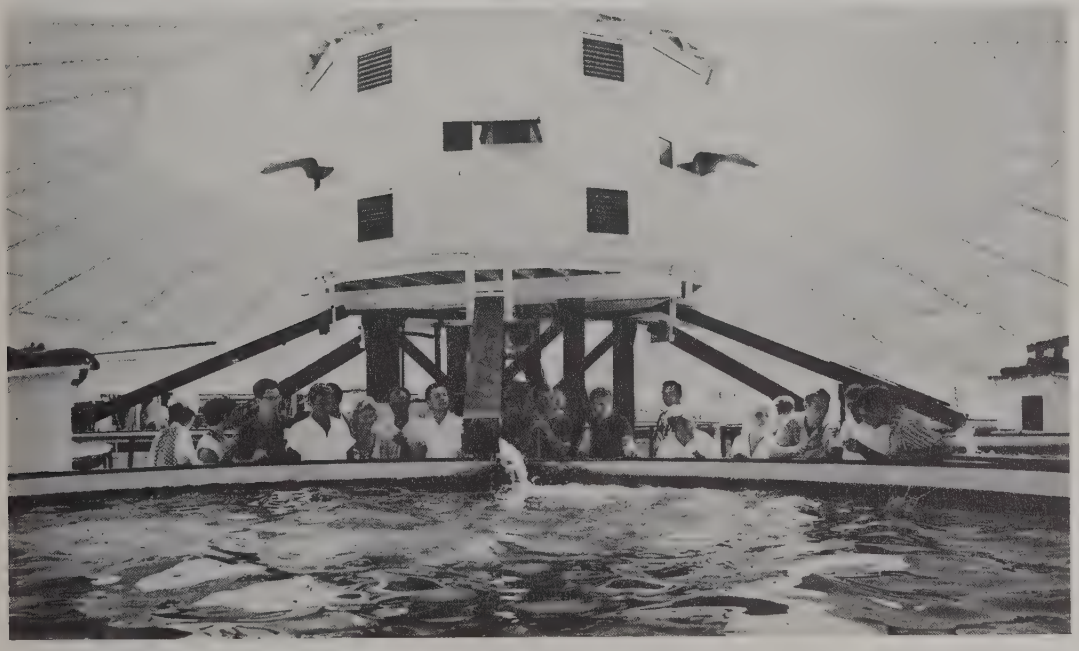
Estimated fair market value main building and annex, land and building, January 1968: $1.25 million.

KEWALO BASIN FACILITIES

The shoreside facilities are located on 42,915 square feet of land leased from the State of Hawaii, Department of Transportation.

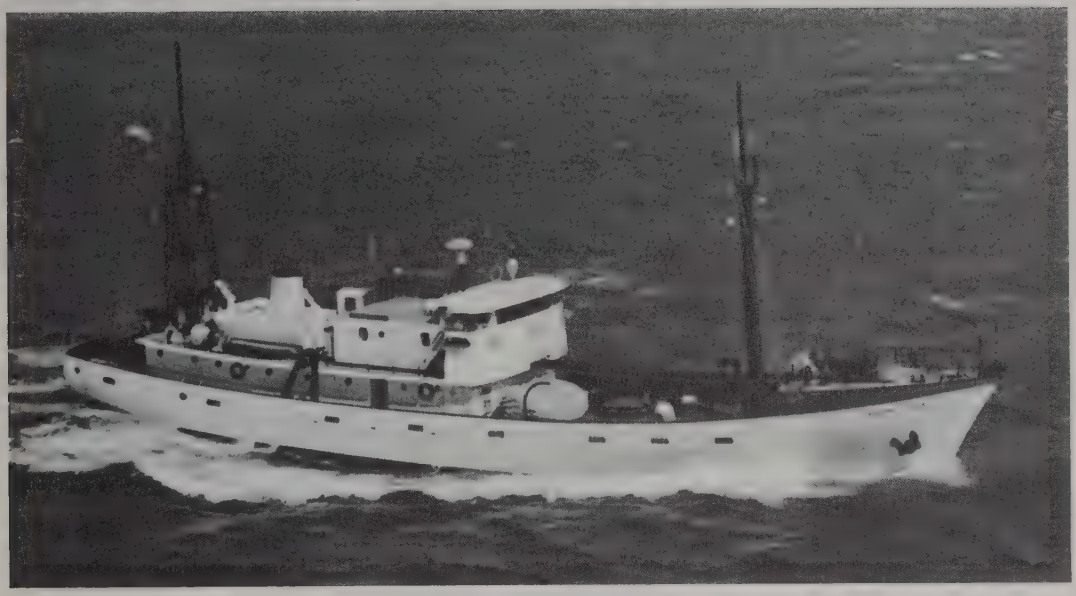
Office-warehouse. A one-story steel structure of 6,400 square feet, consisting of three laboratory work areas, four offices, three storage rooms, a machine shop, and a warehouse; adjacent is a roofed storage area.





Facilities for Research on Tunas. The area at Kewalo Basin also houses facilities for maintaining live tunas. The Laboratory in Honolulu is the only one in the world which has such a facility for the tunas. There are 12 large circular tanks, 8 smaller bait tanks, and a U-shaped tank housed in a structure that can be completely darkened. The complex also contains observation towers. In addition to these stationary tanks, there are five portable tanks for transferring fish from ship to shore. A salt water well on the Kewalo site is capable of supplying 1.5 million gallons of salt water a day.

RESEARCH VESSELS



Townsend Cromwell

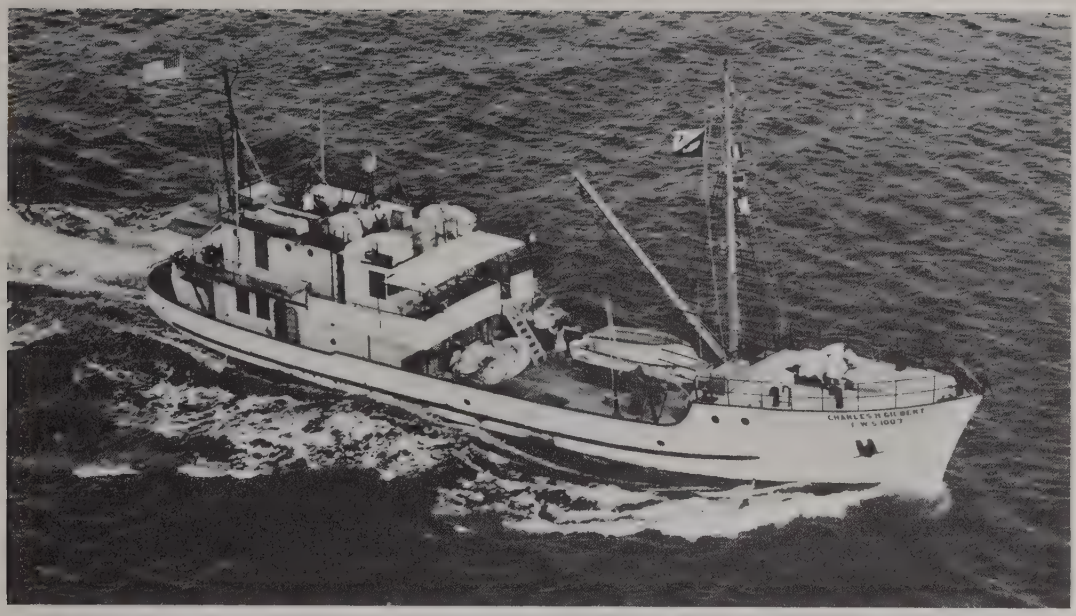
Year built	1963	Capabilities:
Length, overall	158 ft. 6 in.	Sonar studies
Tonnage, gross	565	Electronic telemetering
Speed, cruising	12.5 knots	Biological studies
Speed, maximum	13.5 knots	Oceanographic measurements
Vessel range	10,000 miles	Longlining
Vessel endurance	60 days	Behavior studies
Accommodations:		Midwater trawling
Officers and crew	15	Fish scouting
Scientific staff	10	Gill net fishing

Ancillary equipment:

- CTFM sonar
- Radar
- Loran
- 650-fathom Simrad echo sounder
- 2,500-fathom Furuno echo sounder
- 6,000-fathom Edo echo sounder
- Bathysonde
- Recording pyranometer
- Recording thermograph
- Gyroscopic compass and steering installation
- Electric deck log
- Radio direction finder
- Hydraulic controls for variable pitch propellers
- Single sideband radio set with special Fish and Wildlife frequencies and 250-watt radio telephone and CW

Underwater observation facilities:

- Inui bulb with viewing ports



Charles H. Gilbert

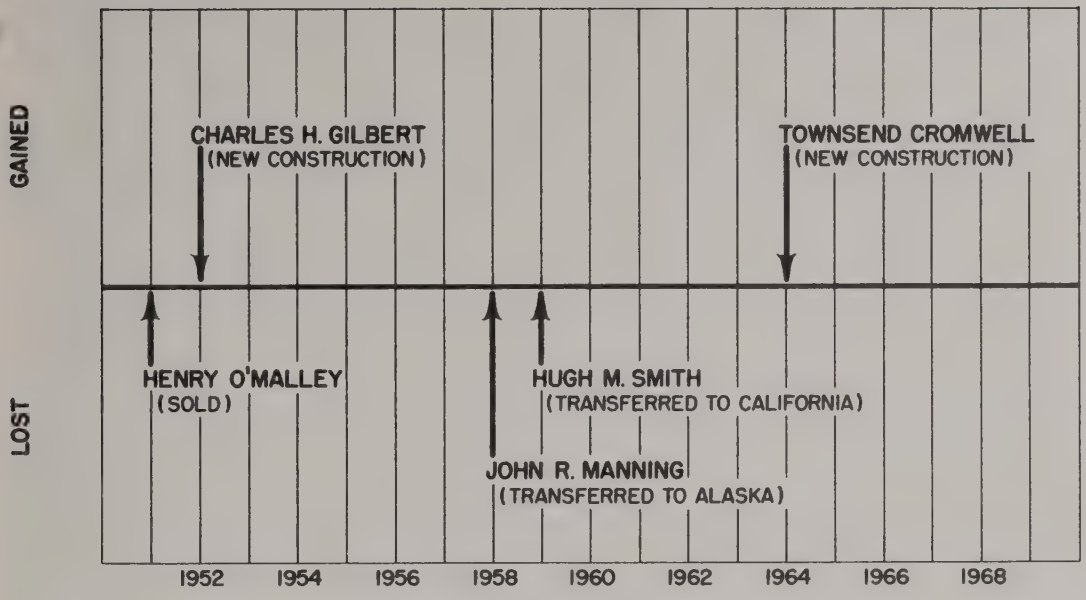
Year built	1952	Capabilities:
Length, overall	119 ft. 9 in.	Oceanographic measurements
Tonnage, gross	196.5	Longlining
Speed, cruising	9.0 knots	Live-bait fishing
Speed, maximum	10.5 knots	Behavior studies
Vessel range	8,500 miles	Midwater trawling
Vessel endurance	80 days	Fish scouting
Accommodations:		Gill net fishing
Officers and crew	12	
Scientific staff	4	

Ancillary equipment:

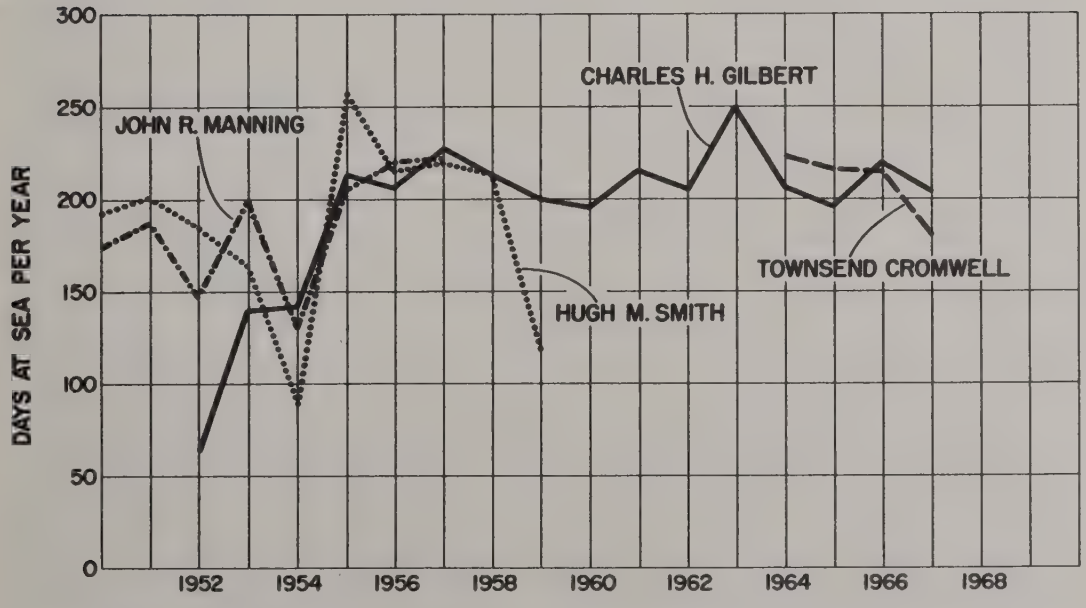
- Radar
- Loran
- Gyro compass
- 400-fathom Bendix recorder
- 6,000-fathom Edo echo sounder
- Single sideband radio set with special Fish and Wildlife frequencies and radio telephone
- Sperry automatic steering
- Radio direction finder

Underwater observation facilities:

- Stern underwater viewing chamber
- Modified bulbous bow with underwater viewing ports



VESSELS OPERATED BY THE BCF, HAWAII AREA, 1950-67.



DAYS AT SEA PER YEAR OF THE VESSELS OF THE BCF, HAWAII AREA.

LONG-RANGE PLAN

FUTURE PLANS

On a generalized timetable, our plans for the next decade are:

(1) to establish a high-seas fishery for skipjack tuna in the tropical Pacific;

(2) to gather sufficient information on the biology of tunas and the economics of the fisheries, to reliably estimate the sustainable yields of the various tuna stocks in the Pacific.

Studies by the Biological Laboratory staff have shown that the skipjack resource in the central and eastern Pacific is capable of sustaining huge harvests over and above present catches. This huge potential harvest of skipjack is of the order of hundreds of thousands of tons. A unit of 100,000 tons of skipjack has a value of $62.5 million after processing. Evidence gathered to date by the Biological Laboratory staff suggests that with the exception of skipjack tuna, the production of the other tuna species in the Pacific Ocean has, in most areas, reached a plateau.

Emphasis will be placed on designing a fishing system which is capable of fully utilizing the skipjack and other fish resources of the tropical and subtropical Pacific Ocean. Included in the development of this system are studies that will for example (1) establish the horizontal and vertical distribution of skipjack in the Pacific Ocean and (2) develop methods to catch these skipjack with purse seines or other types of gear, either by modification of existing gear or the development of new gear and techniques.

For proper management of the high-seas tuna resources, we plan to continue our studies of the biology and population dynamics of the tunas, with special emphasis on the skipjack tuna. Areas of research will include studies of subpopulations of tunas by immunogenetic techniques, behavior, physiology, life history, and ecology. Oceanographic research will be directed toward elucidating the relationship of the tunas to the environment.

The commercial longline fishery in the South Pacific which operates from American Samoa will continue to be monitored, as will the growing skipjack fishery in the western Pacific.

Finally, pending the availability of funds, studies to explore the application of submarines for the conduct of fishery, oceanographic, and other studies of the marine biota will be resumed.